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ABSTRACT

A multidisciplinary educational unit featuring product safety decisions made by businesses and consumers is presented. teach critical thinking and decision making while supplementing the science, home economics, social studies, and economics curricula. The activities rely extensively, though not exclusively, on Procter & Gamble's experiences in making product safety decisions. Included is a core section of lessons from which the complementary discipline sections have evolved. The core section contains a culminating activity that can also serve as an evaluation instrument. Four complementary discipline sections supplement the core. Each activity includes an overview, the teaching time required, concepts covered in the lesson, objectives, materials, teaching strategies, readings, activity sheets, and answers to questions posed in the activity. Student worksheet master are also included. (Four wall charts were too large to reproduce.) (KR)

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# DECISIONS ABOUT PRODUCT SAFETY

## A MULTI-DISCIPLINARY TEACHING UNIT

PROCTER & GAMBLE
EDUCATIONAL SERVICES

## Unit Overview

**DECISIONS ABOUT PRODUCT SAFETY** is a multi-discipline educational unit featuring businesses and consumers making product safety decisions. The unit is designed to teach critical thinking and decision making while supplementing the science, home economics, social studies and economics curricula. The materials are written for the secondary grades and can be readily adapted to the 8th-12th grade student. The activities rely extensively, though not exclusively, on Procter & Gamble's experiences in making product safety decisions.

**DECISIONS ABOUT PRODUCT SAFETY** offers teachers a Core section of lessons from which complementary discipline sections evolve. The Core sets the foundation for the rest of the material by motivating students, establishing a need to know and supplying them with some basic content background. In addition, the Core contains the culminating activity that also serves as an evaluation instrument.

Four complementary discipline sections (Science, Economics, Social Studies and Home Economics) supplement the Core. These are designed to be taught by teachers of the respective subject areas. Although it is recommended that all sections be used, the materials have been designed to offer teachers flexibility in selecting the sections which best fit their schedules and interests.

Each of the five sections of the DECISIONS ABOUT PRODUCT SAFETY unit is designed to be taught in approximately one week. Teachers can mix and match activities from all of the units for the purpose of customizing the material to fit their curriculum, teaching schedule and level of commitment. The five sections include:

### CORE

This section introduces the students to the world of business decision making. It helps students understand the importance of good decisions and appreciate the complexities of the business environment.

- **ACTIVITY 1 What's in a Product?** This activity helps students understand the complexities of the production process and appreciate the vast number of decisions that must be made to produce a successful product. Specifically, the students dissect the product Citrus Hill Plus Calcium, read a case study on the product and discuss the many decisions made to make Citrus Hill Plus Calcium a successful product.

- **ACTIVITY 2 From Development to Disposal: Considering Product Safety.** Students focus on the issue of product safety and the multitude of safety issues and decisions that face manufacturers by participating in a risk management team assigned to identify potential safety concerns for a proposed new product.

- **ACTIVITY 3 Invent Your Own.** Students become involved in the production process by inventing their own products from resources provided to them. An evaluation of the production decisions made is conducted by the whole class using criteria which include product safety.

- **ACTIVITY 4 Hard Choices Simulation.** Students are assigned various roles ranging from business executives to members of concerned citizen groups. Key production, safety and environmental issues are discussed and evaluated as they make decisions as company employees and concerned citizens.

- **ACTIVITY 5 Hard Choices Simulation Revisited.** The simulation described in ACTIVITY 4 is conducted as a culminating activity and evaluation after all sections are presented to the students.

### SOCIAL STUDIES

This section introduces students to the expanding role of government in the product development process. By using a historical perspective and analysis of data, students will become more aware of the government agencies that set standards and regulate business decisions.

- **ACTIVITY 1 A Foundation for Doing Business.** Students review the U. S. Constitution and find that many of the opportunities for business were established by our founding fathers as they wrote the Constitution. A further understanding of the role of government in business is obtained by researching current political activities and determining their influence on business.

- **ACTIVITY 2 Growing Government.** Students discover that the size and cost of government agencies are growing. Since many of these agencies directly or indirectly influence business decisions, business decision making is becoming more complex. Students research an agency of their choice and write a paper on its role and how it has grown.

- **ACTIVITY 3 It's All in a Label.** Students discover how businesses and government agencies work together to make products better and safer. Through an analysis of product labels past and present, students will see how directions, safeguards and ingredients have changed to make products better.

- **ACTIVITY 4 Products Around the World.** Students survey their homes to determine the types and number of foreign made products they have purchased as a family. By reporting to the class and marking a world map, the concept of an international marketplace is introduced.

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# DECISIONS ABOUT PRODUCT SAFETY

An Instructional Unit Prepared For Teachers By:
**THE PROCTER & GAMBLE COMPANY**

## Introduction

Business people must make decisions every day. They decide traditional things such as what to produce, how to produce, and where to produce and distribute. These decisions must be based not only on practical issues like raw material supplies, technology, cost of warehousing and shipping, but also more basic issues such as consumers' wants, environmental concerns, business ethics and product safety. Businesses that have employed people who can make good decisions are businesses which have a very good chance of satisfying consumers, generating consumer loyalty and, consequently, being successful over the long term.

One of the most important and often one of the most complex activities businesses engage in is making decisions regarding the safety of the products they produce. All businesses want their products to be safe. Most businesses will decide not to produce a product rather than bring a potentially unsafe one to market. But how safe is safe? Businesses must ask how many resources can be allocated for product safety. When will consumers stop buying a safe product because the price is just too high or because elements in the product that make it safe reduce its convenience? What does a business do when the product is safe for individuals, but the production process harms the environment? These are some of the many questions that are difficult to answer and require the decision makers to have special information and skills. Often, business decision makers rely on scientific research and experimentation to provide them with evidence or information which helps them make good decisions and evaluate the decisions made previously.

This unique unit of instruction demonstrates the complexities of the decision making process in product development as it relates to product safety. Specifically, the unit opens the doors of business to students. The students see many people in the private and public sectors working together to make good product development decisions. In addition, the students see the connection of what they are learning in the classroom to the day-to-day events of the real world.

## Objectives

The students who participate in this unit should accomplish the following:

1. Realize decision making is the core of business activity.
2. Understand that decisions regarding product safety involve the assessment of risk and the weighing of respective costs and benefits.
3. Understand that the costs of unsafe products are very high to business and society.
4. Realize product safety is a concern of many people in business, government and other community groups.
5. Appreciate the fact that society and business benefit from safe products.
6. Realize safety is a relative concept.
7. Understand that chemicals and other resources used to produce products can be misused and this misuse can influence the safety of a product.
8. Realize product safety needs to be considered when making a consumer decision.
9. Understand that safety to the environment is an important aspect of product safety.
10. Appreciate the partnership between the private and the public sectors regarding product safety issues.

## Cooperative Learning Groups: Strategies for Success

Many activities in this unit require that students work in groups either to complete the activity itself or discuss results or other outcomes. The following is intended to serve as a review of some of the more important principles and practices associated with grouping strategies in the classroom. Teachers who want further information may wish to refer to the list of suggested articles at the end of this reading. Or, consult your teaching colleagues for their suggestions and experiences.

There is now substantial evidence that students working together in small cooperative groups can master material better than can students working on their own. Moreover, additional evidence indicates that having students work in cooperative learning groups can lead to improvement in social skills, in peer relationships, in attitudes and in other objectives. Cooperative principles are used today in an increasing number of elementary and secondary schools across the country.

The process involves more than simply assigning students to small groups. Cooperative learning refers to a set of instructional methods in which students work in small, mixed ability learning groups. In general, individual students have specific roles or responsibilities within the group — cooperative learning is not four students each performing the same task.

Using cooperative strategies almost always produces gains in social outcomes; however, if student achievement is expected, students must work toward a group goal — a goal that depends on the individual learning of all group members. There are many different formats which can be followed, but general recommendations are provided in the answers to these commonly asked teacher questions:

**What is the optimum group size?** The recommended size range for cooperative learning groups is four to six students. Four students is the optimum size for most groups although some tasks, such as review of previously-learned material, might call for larger groups.

**How long should groups stay together?** Some teachers elect to have groups stay together for the entire course; some opt for shorter periods of time — for a specific task or unit of study. There are no rules. Advantages of keeping groups together longer include increased group identification and stability, and increased risk-taking associated with familiarity. If groups are kept together for short periods of time, students are more likely to be exposed to a variety of individual problem-solving approaches and learning styles and the rigidity associated with routine is avoided.

**Should groups be of mixed or of uniform ability?** Research indicates that groups formed of mixed-ability students or those which are heterogeneous with respect to gender, ethnicity and related factors do better than groups that are not.

**How should I assign students to groups?** Some teachers prefer to assign students randomly. However, it is suggested that you carefully consider the makeup of individual groups, as well as considering which students are likely to get along and work productively with each other. Students need not be grouped with their best friends. However, it is necessary that students respect the opinions of members of their groups.

**What are some individual roles students should assume in each group?** It is best to assign specific roles that can and should be rotated for the group to function smoothly. Some of these roles include: a group leader who is responsible for smooth functioning of the group — who checks for accuracy and completeness, encourages students to contribute and who paraphrases student comments so that everyone is understood; a runner who obtains (and returns) necessary materials and equipment; a recorder who records necessary data and observations using tables, charts, etc.; and an observer who may make the initial observations about the activity.

Teachers considering cooperative strategies are often concerned with a means of structuring individual accountability for achievement. Traditional means include requiring everybody to take the same test. Other, non-traditional means may include variations on a practice of randomly selecting one student from a group for evaluation; all others in the group receive the same grade — or to offer some kind of bonus if all members achieve a certain level of proficiency. Another method is to require students to edit each other's work, then randomly selecting one paper for assigning grades to the group.

In order to maximize positive, productive interactions that are the heart of any cooperative group, a number of researchers recommend students spend a minimum of 10% of all group time reflecting on how well the group is functioning. Specific data, such as incidence of various kinds of activities — questioning, praising, summing up — are helpful for this analysis. Such reflection helps ensure groups continue to function effectively.

Cooperative learning groups are one of many strategies used by effective classroom teachers to achieve certain goals. The techniques are inexpensive, easy to implement and consistently effective. As Robert Slavin, director of the Center for Research on Elementary and Middle Schools at Johns Hopkins University, notes, "...In a time of diminishing resources and rising expectations for education, it makes sense to make better use of the one resource every school has in abundance — kids themselves."

**Suggested reading:**

Field, Steven. "Cooperative learning: A strategy for all students." Science Scope, 12(3): 12-14. November, 1988.
Johnson, David W. and Johnson, Roger T. "Cooperation in the Classroom." Interaction Book Company, Edina, MN. 1984.
Slavin, Robert. "Cooperative learning: Can students help students learn?" Instructor, March, 1987.
Slavin, Robert. "Cooperative learning and the cooperative school." Educational Leadership, November, 1987.

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## HOME ECONOMICS

This section helps consumers acquire accurate and complete information in order to purchase, safely use and dispose of household chemical products. The material also creates an awareness of the complexity of both business and consumer product safety decisions.

- **ACTIVITY 1 What's in a Label?** Students conduct a survey to determine the number and types of household chemical products in their homes. Readings include classifications of hazardous chemicals and labeling laws. The role of business in providing clear, reliable directions is examined by comparing label changes in three Procter & Gamble Company products.

- **ACTIVITY 2 If only I...The Case for Safe Product Use.** Students make decisions regarding safe use, storage and disposal of household products. They examine the concern of businesses for foreseeable consumer misuse. Special attention is given to prevention and treatment of children's accidental poisoning.

- **ACTIVITY 3 Consumers and Businesses: Partners in Product Safety.** Students examine the issues of product safety from both a consumer and business perspective. These issues include solid waste disposal, product packaging and safety testing.

- **ACTIVITY 4 Garbage Decision Making.** Students discover that decisions often have long-term impacts and secondary effects as they devise their own solution to the solid waste problem in America. After researching and reading about the magnitude of the problem, students develop a solution to the problem and write a position paper. Groups of students evaluate the individual ideas and reach consensus on a solid waste plan.

## ECONOMICS

This section stresses the decision making process as related to consumers and business people. It utilizes a variety of activities to discuss "how safe is safe?" and to demonstrate how people make decisions regarding product safety. Special emphasis is given to the process of bringing a safe product to the market.

- **ACTIVITY 1 Life and Death Decisions.** Students record and evaluate the importance of their daily decisions. After listing the decisions they have made over a period of time, they determine the potential costs and benefits of their choices.

- **ACTIVITY 2 Make It Right.** Students realize how resource availability influences what and how products are made as they actually make a product using different resources. The decisions made in response to the what and how questions determine the product's safety and its impact on the environment.

- **ACTIVITY 3 Suds and Safety.** Students see how important product safety issues are to business as they read a case study on soaps and detergents. They examine the testing procedures businesses use to make a product safe for normal use and foreseeable misuse. Students identify the respective costs and benefits of making a product safe.

## SCIENCE

This section helps students see how the scientific method is used to select ingredients for product development and to test for toxicity. Proper use and disposal is discussed from a toxicity perspective. The concept of safety is enhanced to include environmental concerns and risk management.

- **ACTIVITY 1 Tartar Control Crest: A Case Study in Consumer Product Safety.** Students read a case study of the development, testing and marketing of Tartar Control Crest. Students learn that tartar is a chemical precipitate and investigate the chemical conditions under which selected precipitates may form.

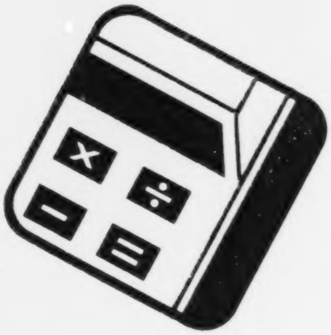
- **ACTIVITY 2 Risk.** Students investigate basic concepts of risk comparison as they examine a selected group of activities that carry a probability of death of one in one million. Students then examine their own knowledge and beliefs about risk as they rank order a list of 15 other activities with regard to the risks. As they compare their estimates to the actual data and discuss their answers, students realize that all activities have associated risks and risks can be determined mathematically and compared.

- **ACTIVITY 3 Toxicity.** Students taste toothpaste or other consumer products to establish their threshold for the product. Students discover that the human body reacts to different chemical substances in different ways and that thresholds of various substances vary widely. Students then calculate the amount of toothpaste they will swallow in a lifetime of brushing. This calculation leads to an investigation of toxicity in which the effects of dose, route of exposure, intrinsic toxic potential, and duration and frequency of exposure are discussed.

- **ACTIVITY 4 Environmental Safety.** Students use paper chromatography as a simulation of laboratory techniques used to identify and monitor product residues in the environment, and study the effect of dilutions of various consumer products on the growth of algal cultures. Issues in environmental safety, especially the difficulty of developing accurate, predictive models are discussed.

Teachers' Manuals

- Core curriculum
- Economics unit
- Home Economics unit
- Science unit
- Social Studies unit



# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR CORE CURRICULUM

PROCTER & GAMBLE
EDUCATIONAL SERVICES

# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR CORE CURRICULUM

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We hope you find DECISIONS ABOUT PRODUCT SAFETY a useful and helpful addition to your classes.

Patti J. Shively
Manager, Educational Services
Procter & Gamble Company

# Decisions About Product Safety

## Introduction

The Core component to the complete unit entitled DECISIONS ABOUT PRODUCT SAFETY is designed to present the importance of the decision making process in business. Successful business people must address the What to produce, How to produce and For Whom to produce questions on a continuous basis. Good decisions relating to these questions will help make a business successful, poor decisions will virtually guarantee failure.

Integral to each of these basic questions is the concept of product safety. All legitimate businesses want to design, produce and market safe products. In fact, no reputable business will knowingly place products on the market that are unsafe for the purpose for which they are designed. Companies realize if they do, they will not have long-term success. The problem becomes how the goal of producing a safe product can be achieved in a world of scarcity. Specifically, difficult decisions must be made regarding the use of ingredients and type of packaging as they relate to product safety and environmental concerns. Few, if any of these decisions are easy because no single course of action is absolutely correct. A variety of alternatives is possible — each has its good and bad points and each has an opportunity cost, i.e., choosing one alternative forces the decision maker to give up the benefits of the next best alternative.

Making good decisions requires accurate information, an awareness of corporate and personal values, an understanding of costs and benefits and a realization that the consequences of choice lie in the future. Added to these prerequisites of good decision making is the fact that decision making is a skill which can be learned and must be practiced for proficiency to be reached.

The preliminary Core material is designed to be completed in three to five class periods depending upon the number of homework activities completed by the students. "Hard Choices Simulation Revisited" follows the complementary discipline sections and requires one additional class period. This activity can be viewed as the evaluation component.

Several methods of instruction are used in the lessons. Teachers should feel free to "mix and match" elements in the Core with their own material and with material found in other parts of DECISIONS ABOUT PRODUCT SAFETY where appropriate to meet their own specific objectives.

**What's in a Product?** This activity helps students understand the complexities of the production process and appreciate the vast number of decisions that must be made to produce a successful product. Specifically, the students dissect the product Citrus Hill Plus Calcium, read a case study on the product and discuss the many decisions made to make Citrus Hill Plus Calcium a successful product. Students learn how one decision can build upon another to form a knowledge base that expands creativity.

**From Development to Disposal: Considering Product Safety.** Students focus on the issue of product safety and the multitude of safety issues and decisions that face manufacturers by participating in a risk management team assigned to identify potential safety concerns for a proposed new product.

**Invent Your Own.** Students become involved in the production process by inventing their own products from resources provided to them. An evaluation of the production decisions the students made is conducted by the whole class using criteria which include product safety.

**Hard Choices Simulation.** Students are assigned various roles ranging from business executives to members of concerned citizen groups. Key production, safety and environmental issues are discussed and evaluated as they relate to the decisions made by the executives.

**Hard Choices Simulation Revisited.** The "Hard Choices Simulation" is conducted as a culminating activity and evaluation after all sections are presented to the students.

# What's In A Product?

## A Case Study of Citrus Hill Plus Calcium

### Overview

Students understand the complexities of the production process and appreciate the vast number of decisions that must be made to produce a successful product by analyzing Citrus Hill Plus Calcium orange juice and reading a case study.

Decisions about the use of resources, product safety, protection of the environment, consumer satisfaction, employees, marketing and price are some of the areas businesses must address when producing a product. In every decision making area, alternatives exist and must be considered.

### Time required

One class period

### Concepts covered in this lesson

Decision making
Costs and Benefits
Environment
Production
Scarcity
Resources

### Objectives

Students who participate in this activity should be able to:

1. Realize decision making is the core of business activity.
2. Understand that decisions involve an assessment of costs (risks) and benefits.

### Materials

Citrus Hill Plus Calcium label
THE CALCIUM CONNECTION case study for each student

### Teaching strategies

This lesson will help students understand the complexities of the production process. Students understand that making a successful product requires that many people make many decisions which influence the lives of many people. Note: For a more detailed account of the production process see Procter & Gamble's **INSIGHTS INTO ECONOMICS, MARKETING AND ADVERTISING.**

1. Divide the class into groups of 4 to 6. Inform students they are to "dissect" a product (Citrus Hill Plus Calcium) into all of it's component parts. Although it is virtually impossible for the students to identify all of the "factors of production" at this time, a preliminary list will begin to demonstrate the types of concerns business people have when developing a product.

The dissection process should first include a listing of ingredients used in production. The product label will help students in this part of the activity The second analysis should identify the proposed machinery and workers necessary to make the product. The machinery and worker list can be general for the students must hypothesize what the production process is at this point. The third list should include packaging material and the types of workers and equipment needed to bring the product to market.

It is recommended that the teacher give each group the opportunity to review the Citrus Hill Plus Calcium label before the dissection process begins.

2. After each group has made an initial listing of the necessary components for production and bringing the product to market, distribute the case study, THE CALCIUM CONNECTION, to all students. Direct the students to read the case study and, if necessary, revise their lists of production and marketing components for orange juice. (Chances are the reading will make them realize they had not thought to include researchers, scientists and people for the evaluation of safety in their initial lists). Ask each group to select a person to be the recorder and write its list on the chalkboard. Direct the students to be as specific as possible.

3. Ask the students to respond to the following questions when the lists are completed (suggested responses are provided):

a) Which item on the list is the most important factor in the production process of this product?

*(It is likely the students will argue over which is the most important and then conclude that each item on the list is an important building block of the product.)*

b) What questions must be answered when producing a product?

*(Generally, What, How, How Many and For Whom to produce.)*

c) Could this or a similar product be produced with a different list of factors?

*(Although all products need a combination of Land (natural resources), Labor (human effort), Capital (machinery) and Entrepreneurial resources (creativity and risk taking), the specific decisions within each of these categories can vary widely.)*

d) Could this list of factors produce a different product?

*(Resources can be used to produce many different products.)*

e) Why do you think the company that produced the product we "dissected" or broke into its component parts selected the factors listed?

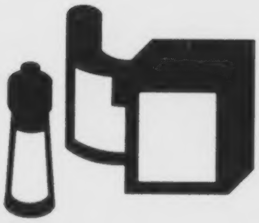
*(Companies seek to find the factors of production that are inexpensive, safe, effective, available in sufficient quantities and possess the characteristics that will allow a product to be produced that consumers want.)*

f) Do you think we have an exhaustive list of factors or items business people must make decisions about regarding this product?

*(No, chances are good that students did not include materials and people that evaluate the product's safety or the people and equipment involved in customer service once the product is sold and other types of support activities involved in producing and marketing a product.)*

Teachers should suggest that the production and market decisions of business are more complex than even the students' lists imply. For example, product safety, environmental concerns, advertising, consumer feedback decisions and others must be made and corresponding resources employed.

Additionally, the teacher should ask, What effect does a decision to produce a product in our community have on people even though they may not produce that product? Students will begin to think about the interconnected nature of economic activity.



# The Calcium Connection

The story of Citrus Hill Plus Calcium is a complex one. It's not just a story of adding a few ingredients to orange or grapefruit juice to make a new product. It's the story of a partnership of many people in different jobs making decisions that build upon one another to form a knowledge base which encourages research and innovation and allows new products to come to the market. And it all started with "tattletale gray" clothes!

Procter & Gamble's first calcium research began in the 1960s when the company was looking for a way to make a laundry detergent that would get clothes cleaner and brighter. Calcium and other minerals are the culprits which cause the "tattletale gray" of laundered clothes. Business decision makers and researchers concluded a bright wash could be achieved if a way could be found to keep calcium in the wash water from redepositing on the clean clothes. The research ended in West Germany when a scientist found that a compound called diphosphonate kept calcium solids suspended in water so they would rinse away.

While studies involving calcium research were being conducted on detergents, other scientists at Procter & Gamble were researching the nature of tartar formation on teeth. Their goal was to remove dental tartar from teeth safely without damaging the underlying tooth enamel. Many compounds were tested. One (the "new" diphosphonate) called etidronate formed calcium salts on the teeth, protecting them from further tartar deposits. This calcium study formed the basic for developing Tartar Control Crest toothpaste.

These breakthroughs were just the beginning of the company's calcium research. The potential of diphosphonate seemed substantial and the new knowledge gained from the research encouraged the company's scientists to think about other ways to place calcium where it is needed and keep it from forming where it shouldn't be.

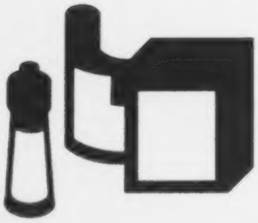
In 1968, Procter & Gamble learned of a two-year-old girl who was critically ill. She had abnormally high levels of calcium in her muscles and it was restricting her breathing. Procter & Gamble was not yet a drug company, but company decision makers thought diphosphonate could help the child. They asked for and received approval from the Food and Drug Administration for the doctor to use the new compound on the child. The child improved remarkably, and with several years of therapy, she was able to lead a normal life. This use led to development of a prescription product the treatment of a skeletal disorder called Paget's disease.

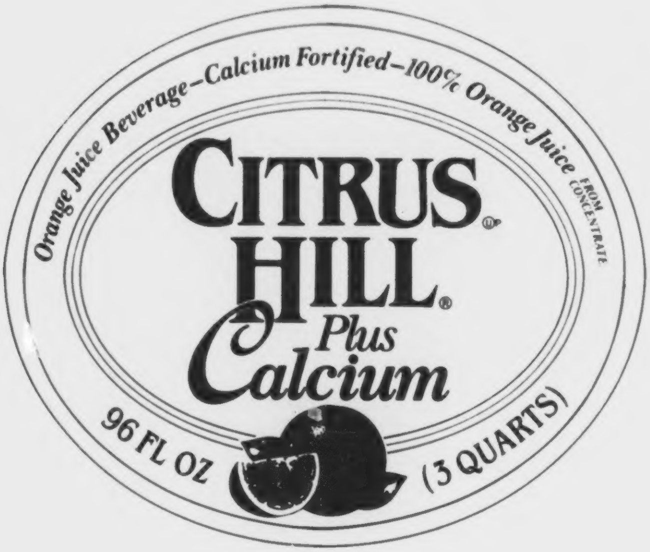
From this diverse research and knowledge about calcium Procter & Gamble developed Citrus Hill Plus Calcium. By combining calcium hydrate or carbonate citric acid and malic acid together, a superior calcium delivery system was created. Studies showed that the calcium in Citrus Hill Plus Calcium was more readily absorbed by the body than from other sources including milk and ordinary calcium supplement pills.

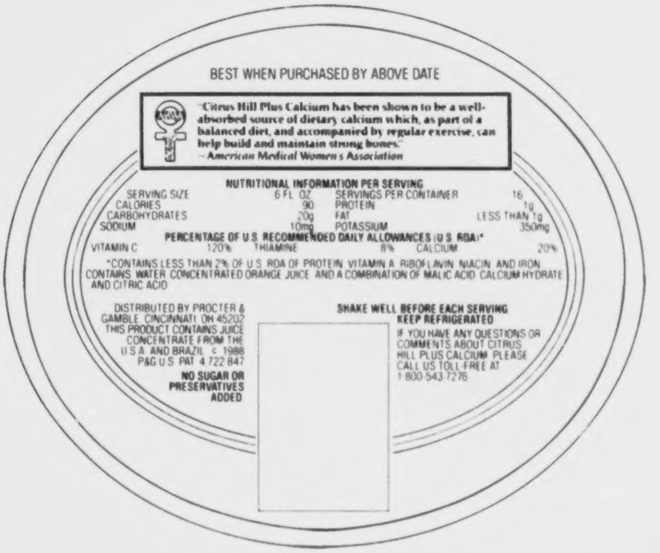
The next step was to make sure this new product did not introduce new risks of medical problems to consumers. All the ingredients included were considered safe and were commonly used in other food products. However, consumers don't expect to find calcium in their orange juice and may not be aware it is in there. To evaluate the safety of the product, the company worked with two groups of scientists. First, a group of company experts — medical doctors, toxicologists, etc. — met and asked as many questions as they could about product safety to make sure all possible safety issues were covered. Then a group of non-Procter & Gamble medical and nutrition experts from all over the country were convened to review the company's plans for the new product, formulas and all the safety data. Only when this group of experts was satisfied that consumers were safe, did the company market Citrus Hill Plus Calcium.

This new juice made by combining regular orange or grapefruit juice with calcium and related compounds is currently helping combat osteoporosis, a disease which accelerates the aging process in which bone mass begins to decrease with loss of bone. This weakens the bones and they become more likely to fracture. Foods rich in calcium can help reduce the suffering this disease can cause and can reduce the number of young people who will acquire this disease when they get older.

From laundry detergent to toothpaste to prescription drugs to orange juice with calcium — as is often the case, it is difficult to end the story of a product's development process. Research continues and what we learn from research on this product will lead other decision makers and scientists to say "There must be a better way," or "The success of this product gives me an idea..."




Orange Juice Beverage–Calcium Fortified–100% Orange Juice FROM CONCENTRATE
CITRUS HILL® Plus Calcium
96 FL OZ
(3 QUARTS)



BEST WHEN PURCHASED BY ABOVE DATE

> **"Citrus Hill Plus Calcium has been shown to be a well-absorbed source of dietary calcium which, as part of a balanced diet, and accompanied by regular exercise, can help build and maintain strong bones."**
> **– *American Medical Women's Association***

**NUTRITIONAL INFORMATION PER SERVING**

| | | | |
|---|---|---|---|
| SERVING SIZE | 6 FL OZ | SERVINGS PER CONTAINER | 16 |
| CALORIES | 90 | PROTEIN | 1g |
| CARBOHYDRATES | 20g | FAT | LESS THAN 1g |
| SODIUM | 10mg | POTASSIUM | 350mg |

**PERCENTAGE OF U S RECOMMENDED DAILY ALLOWANCES (U S RDA)***

| | | | | | |
|---|---|---|---|---|---|
| VITAMIN C | 120% | THIAMINE | 8% | CALCIUM | 20% |

*CONTAINS LESS THAN 2% OF U S RDA OF PROTEIN VITAMIN A RIBOFLAVIN NIACIN AND IRON
CONTAINS WATER CONCENTRATED ORANGE JUICE AND A COMBINATION OF MALIC ACID CALCIUM HYDRATE AND CITRIC ACID

DISTRIBUTED BY PROCTER & GAMBLE CINCINNATI OH 45202
THIS PRODUCT CONTAINS JUICE CONCENTRATE FROM THE U S A AND BRAZIL © 1988
P&G U S PAT 4 722 847

**NO SUGAR OR PRESERVATIVES ADDED**

**SHAKE WELL BEFORE EACH SERVING**
**KEEP REFRIGERATED**

IF YOU HAVE ANY QUESTIONS OR COMMENTS ABOUT CITRUS HILL PLUS CALCIUM PLEASE CALL US TOLL-FREE AT 1 800-543 7276

# From Development To Disposal:

## Considering Product Safety

### Overview

This activity and reading are designed to help student focus on the issue of product safety and the multitude of safety issues and decisions that face manufacturers. Oftentimes, consumers are unaware of the extensive amount of safety testing that is performed on products used in homes every day.

### Time required

One class period

### Concepts covered in this lesson

Risk
Risk Management
Cost and Benefit

### Objectives

Students who participate in this activity will be able to:

1. Demonstrate an awareness of the importance of safety testing consumer products.
2. State at least two human or environmental safety concerns that producers face during the manufacturing process.
3. State at least two human or environmental safety concerns that producers face relative to consumer use of the product.
4. State at least two human or environmental safety concerns that producers face relative to the method of a product's disposal.

### Materials

FROM DEVELOPMENT TO DISPOSAL — CONSIDERING PRODUCT SAFETY
Student Reading sheet

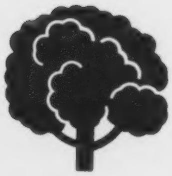
### Teaching strategies

1. Divide the class into groups of 4 to 6 students. Explain that they are going to become members of a risk management team to provide their company's management with advice concerning the development of a new dishwashing liquid. Their task is to identify as many potential risks to humans and the environment as possible before work on the new product begins. Their questions need not be complex, nor do they need to offer answers or solutions to the issues raised.

2. Distribute the Student Activity Sheet which outlines the task for students. Encourage students to write at least one safety question for each of the items listed in the outline.

3. Have groups report and encourage student interaction as groups compare and contrast responses. Note their responses on the chalkboard or overhead transparency.

4. Distribute Student Reading, FROM DEVELOPMENT TO DISPOSAL — CONSIDERING PRODUCT SAFETY. The structure of this reading parallels the Student Activity Sheet. Encourage students to check their responses on the activity sheet against the safety issues raised in the reading.



5. Conclude the lesson by asking the following summary questions:

   a) Give two examples each of safety issues that concern the manufacturing process, consumer use and product disposal.

   b) Give two examples of tests that might be conducted to determine if a product is safe for human use.

   c) Why should businesses be concerned about the human and environmental safety of their products?

STUDENT
ACTIVITY

TO: Risk Management Team
FROM: Product Manager, Liquid Detergent Division
RE: Development of new liquid dishwashing detergent

As you may have heard, the Board of Directors has given the Liquid Detergent Division the green light to develop a new liquid dishwashing detergent. Before the division begins the difficult and costly task of developing this new product, I'm asking your help in alerting us to the potential safety issues and factors we need to consider. I have outlined some general areas to address. Please list as many safety concerns as you can for each of these areas. **Please consider safety to workers, consumers and the environment as you work.** Thank you for your help.

**I. Safety in the Manufacturing Process**

A. Workers' Exposure to Ingredients

B. Selection of Ingredients

C. Shipment of Ingredients

D. Storage of Ingredients

**II. Safety of the Product in Use**

A. Packaging the Product

B. Product Labeling

C. Consumer Contact with the Product -
Exposure to the Product Through Intended Use

D. Exposure to the Product from Accidental
and Non-Recommended Use

**III. Safety of the Product After Use**

A. Disposal of the Product

B. Disposal of the Package

C. Impact on Humans

D. Impact on Environment

STUDENT
READING

# From Development to Disposal --

## Considering Product Safety

In the preceding exercise you were challenged to think about many of the safety issues facing manufacturers of consumer products. Now you will be able to compare the safety issues you identified with those mentioned in this reading. Which did you identify? Which did you mention that are not included in this reading?

We all use consumer products. The decisions we make as consumers when we choose products to purchase are really quite complex. We usually consider things like the product's effectiveness, price convenience, packaging, color, scent, taste and more. If it's a product we have used many times before or which our parents have used, we seldom wonder about whether or not the product is safe. When we think about product safety, it is probably about a particular aspect that is relevant to us in a particular situation. For example, if we get shampoo in our eyes, we might be concerned if it will harm them. Or, if we have a small child at home, we might wonder if a product would be harmful if swallowed.

Although consumers generally may not give much thought to the safety of ordinary household products, an incredible amount of thought has been given to safety by the manufacturers of these products. Making sure products are safe is a primary concern at Procter & Gamble. At every stage of their development, consumer products and their ingredients are subjected to rigid safety assessments. The final decision that a product is safe to market is made only after extensive testing has shown the product to be safe.

To understand just how involved this process is we must start long before we purchase the product and use it in our homes.

We'll need to start at the manufacturing process. The separate ingredients must be manufactured and shipped to the plant where the final product will be produced. Scientists evaluate the safety considerations of those ingredients during manufacture, shipping and storage. What risk, if any, is there to humans through exposure to the individual ingredients? What risk exists through exposure to the ingredients in combination? Could handling or inhaling the substance during production pose safety risks for the workers? What measures will be taken to control exposure? What risks are posed to the environment? For example, what would be the result if a tank car of an ingredient spilled into a river or if a storage tank ruptured sending fumes into the air? Questions such as these must be answered not only for the ingredient's use during the manufacturing process, but in shipment and storage in warehouses, grocery stockrooms and finally, in consumers' homes.

Yet another aspect of a product's safety evaluation is the package used to hold it. Can the package be used safely? Are there any sharp edges around the opening which could cause cuts? Is it tamper-resistant? Should it have a child-resistant opening? What directions for use should be included on the label? What warnings should be on the label?

Next, the safety of the product in use is considered. Using our example of dishwashing detergent, company toxicologists consider what consumers' exposure will be during use. What effect will the product have when it gets on the consumer's skin during use, or when its scent is inhaled? What risk, if any, arises from eating food on dishes washed with the detergent? Toxicologists also consider what exposure might result from accidental and non-recommended use. What if the product is accidentally ingested or comes in contact with a consumer's eyes? What if a consumer decides to use the detergent as a shampoo or to bathe a pet?

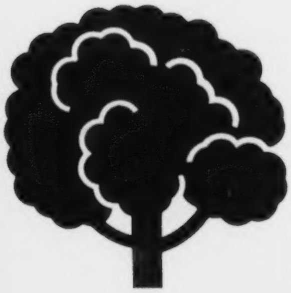
Safety after use is the next consideration. Since dishwashing detergent is generally used with water and is disposed of down the drain, it's important to know what happens after the product is released into the environment. Will it harm fish or wildlife? What about the product's package? What impact does its disposal have on the environment? Can it be recycled? Can it be safely incinerated?

After determining how an ingredient or product might be used or misused and at what concentration people or the environment might be exposed to it, toxicologists choose appropriate tests to obtain needed information. Tests are conducted to determine both short-term and long-term effects of product use to humans and the environment. Tests may include such procedures as the use of bacterial cultures to detect the potential of a chemical to cause cancer. Other tests use cell and tissue cultures. When the safety of an ingredient or product can't be determined by any other methods, tests using animals are required. While companies like Procter & Gamble are committed to searching for alternatives to animal testing, many alternative tests do not predict the effects of chemicals on humans reliably. Procter & Gamble's policy emphasizes using animal testing only when no alternative exists. The company is searching for ways to use fewer animals and to replace animal tests wherever possible with non-animals tests.

If laboratory testing indicates the material is safe, the next step may be testing the product with people. Since the use of a dishwashing product involves regular contact with the skin, tests are designed to evaluate the potential for allergic reaction. This is done with a series of "patch tests" — an exaggerated concentration of the product is applied to the arms of human volunteers. Or, hands may be immersed in a solution of the product or the solution may be rubbed directly onto the skin.

Finally, the product is tested in consumers' homes. Groups of homemakers use the product exclusively for handwashing dishes and a dermatologist examines each person's hands regularly.

Only after all the numerous tests have provided assurance that a product is safe — to humans and to the environment — is the product ready to be marketed.



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TEACHER
RESOURCES

# Invent Your Own

## A Product Simulation

### Overview

Students become involved in the production process by inventing their own products from resources provided to them. The necessity for resources, creative thought, effort and an awareness of consumers' needs and wants is demonstrated in this simulation. In addition, the "producer" will experience many of the production decisions commonly addressed by business executives today.

### Time required

One class period

### Concepts covered in this lesson

Costs and Benefits
Decision making
Production
Resources
Scarcity
Safety
Environment
Consumer

### Objectives

Students who participate in this activity should be able to:

1. Realize decision making is the core of business activity.
2. Understand decisions involve an assessment of costs and benefits.
3. Understand choices are made from a variety of good and bad alternatives.
4. Appreciate that consumers are the ultimate evaluators of a product.

### Materials

Per student group of 4-6:
A "junk box" of paper, paper clips, toothpicks, glue, polystyrene cups, straws, spools, envelopes, etc.
For each student:
INVENTION EVALUATION FORM

### Teaching strategies

This activity simulates a production process and demonstrates the development of a product. It helps students appreciate and relate with business decision makers and the many concerns producers have. The lesson demonstrates that the consumer is the ultimate evaluator and successful businesses produce what the consumer needs and wants.

1. The teacher should collect a variety of items (toothpicks, polystyrene cups, straws, glue, tape, tag board, paper, paper clips, scissors, pencils, pens, etc.) and place in containers (one for each group). The "junk boxes" represent some of the potential factors of production the student groups have available to them to invent and make a product.

2. Ask each student to identify his or her favorite inventor. Suggest that we have famous inventors and not so famous inventors. Ask students who invented the airplane (the Wright Brothers) and who invented the light bulb (Thomas Edison) and who invented Eskimo Pies (Chester Nelson). The point to be made is that each and every product we use was invented by someone. As people's values change their wants also change. Fortunately, people continue to try to fulfill the

wants of others so inventing continues. Inventors are motivated to act this way because of ego and self esteem, profits or a need to be creative and helpful.

3. Students will assume the role of inventors. Divide the students into groups of 4-6 and assign each group the task of inventing a new product by using the factors of production (resources) found in the "junk boxes" provided. Suggest the students be conscious of the decisions they make as inventors of new products, e.g., what resources to use or discard, how to use one's time, who will use the item, how much value will potential consumers place on the inventions and why, etc.

4. Upon completion of the invention, ask each group to present its invention to the class. The two-minute presentations can take the form of an informative advertisement. Have the students address the questions of resource use and costs, safety and environmental impact. (It is quite possible the inventors have not considered all of these question areas. When this occurs, simply suggest that producers have a large number of concerns and many decisions to make). How was the product's safety determined? What is the recommended disposal of this product (placed in a landfill, burned or recycled)? How will the product be marketed? Continue the discussion with the inventor by asking what other decisions had to be made in order for this invention to be produced. If all question areas were not addressed by the inventor, ask why these concerns were not considered.

List the products made by the groups on the chalkboard. After all presentations have been given, conduct a vote to find the "best invention." Record the the vote totals next to the product name on the chalkboard.

After the vote has been taken, distribute an INVENTION EVALUATION FORM to every student. Ask the students to complete the form for every invention and tally the scores. Vote again using the top rated product on the students' evaluation forms as the determining factor. Compare and contrast the first vote to the vote that was determined by using the evaluation form. (Often students' opinions on products are based upon friendships, uniqueness and method of presentation rather than the way a product is made, its usefulness, its safety, environmental impact and other important factors.

Suggest to the students that businesses consider these factors when production decisions are made and consumers should consider the same factors in making purchasing decisions.

STUDENT
ACTIVITY

# Invention Evaluation Form

Name ______________________________ *Date* ____________

**Purpose** To evaluate the inventions, give them a numerical score and cast a second vote.

**Directions** If the criterion has been fulfilled for the invention being reviewed, place a "Y" in the box next to that criterion.

Add up the total number of "Y"s for each invention.

| | | | **INVENTIONS** | | |
|---|---|---|---|---|---|
| **CRITERIA** | 1 | 2 | 3 | 4 | 5 |
| High quality product? | | | | | |
| Has a useful purpose? | | | | | |
| Is safe when used as directed? | | | | | |
| Is safe when misused or used by children? | | | | | |
| Can be disposed of easily and safely? | | | | | |
| Is environmentally safe? | | | | | |
| Can be made inexpensively? | | | | | |
| Is legal? | | | | | |
| Will last? | | | | | |
| Is inexpensive to use? | | | | | |
| **TOTALS** | | | | | |

# Hard Choices Simulation

## Deliberation and Decision Making about Product Safety

### Overview

Students are involved in making and evaluating business decisions about product safety and environmental concerns. Students are assigned roles ranging from company employee to concerned citizen as they explore the complexities of making difficult decisions from both business and societal viewpoints. Students will see that often a decision is difficult to make if the goal is to satisfy all views.

It is suggested the activity be revisited at the end of the complete unit. This culminating activity will demonstrate how the students have changed their views and can be used as an evaluation of the effectiveness of the instruction and corresponding materials.

### Time required

One to two classes

### Concepts covered in this lesson

Decision making
Costs and Benefits
Environment
Profits
Production
Scarcity
Risks
Resources
Market
Producer
Consumer

### Objectives

Students who participate in this activity should be able to:

1. Realize decision making is the core of business activity.
2. Demonstrate an understanding that decisions involve costs (risks) and benefits.
3. Demonstrate an understanding that choices are made from a variety of good and bad alternatives.
4. Demonstrate an understanding that environmental concerns influence business decisions.
5. Realize that costs of an unsafe product are very high for consumers and business.
6. Demonstrate the ability to work cooperatively toward a common goal.

### Materials

REAL CASES activity sheets
COMPANY EMPLOYEE ROLES activity sheets
COMMUNITY MEMBERS activity sheets
CRITERIA AND EVALUATION activity sheet

## Teaching strategies

In this simulation students work in groups as either company employees or community members. In their groups students will be confronted with several business and environmental questions and asked to make and defend their decisions. The purpose of the simulation is to help students understand that decision making requires accurate information, a weighing of costs and benefits, an understanding of the goals of both consumers and business and the ability to manage risks. Students will realize that few choices are accepted by all concerned. The related conflict and accompanying resolution is a difficult process.

This simulation can be used again as a culmination activity after the selected speciality section or sections have been taught. Teachers are to follow the same directions for the second round as for the first.

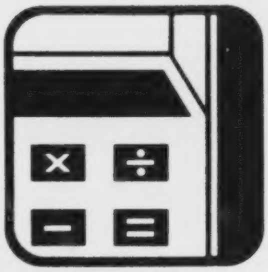
1. Explain to the students that they are about to become a simulated community with each of them taking on an important role. The local manufacturing company referred to should be viewed as the area's major employer. Divide students into groups of company employees and community members. There are a variety company and community member roles. Copy the pages of role descriptions and cut them into strips to distribute to the students. You may want to place the role strips in a bowl and let the students draw their roles. Although each role description is brief, there should be enough information for each student to identify with the role he or she is playing. Class size may dictate having two groups of executives and community members working on the same issues simultaneously. This will permit even greater expression of ideas and viewpoints. Simply call them Group I company employees and community members and Group II company employees and community members. Or, students may want to come up with their own name for their company or community.

In the course of this simulation company employees and community members will be informed of several business and environmental issues the company is faced with that could impact consumers and the community. Both company employees and community members will be asked to consider the problem and offer solutions. Each group will then present its solutions to the other for reaction.

2. To help students establish criteria for making and evaluating decisions, ask students what factors should be considered by business and community members when making decisions. Items listed may include:
   - environmental safety
   - cost
   - product safety
   - meeting the needs of the consumer
   - keeping prices competitive
   - jobs for community members
   - company image

Encourage each group of employees and community members to select its five most important criteria. Groups may add three additional personal criteria to the list. This process should prove challenging as conflicting interests will emerge among the company employee and community member groups. Distribute the CRITERIA AND EVALUATION WORKSHEET and allow several minutes for the groups to come to consensus on criteria. Have students record their criteria on the CRITERIA AND EVALUATION WORKSHEET.

3. Project or distribute ISSUE/CONCERN #1. Allow each group of employees and community members to work independently on the problem for a specified time. Each group should select a



leader, recorder and reporter. Each group must come to consensus and be able to defend its position. When time has elapsed, employees and community members should meet to offer their respective solutions to ISSUE/CONCERN #1. If two groups of employees and community members are used, the second group of employees and community members should do the same.

4. Each group, using its own criteria, should rate the decision presented to it (i.e., the community members rate the company employee's decisions and vice versa). A scale of 1-5 using 1 as the rating for a totally unacceptable decision to 5 for a completely acceptable solution should be employed. After company employees and community members have shared their decisions and ratings, allow time for additional dialogue to see if the groups can reconcile discrepant decision ratings. This follow-up dialogue may prove to be the most enlightening aspect of this lesson as each side will have the opportunity to persuade or dissuade the other relative to a course of action.

5. Continue with additional ISSUES/CONCERNS following the procedure described above, selecting at least one from the final four ISSUES/CONCERNS. These four are real cases and include the decisions actually made by Procter & Gamble. These ISSUES/CONCERNS include a selection of options which might be considered, though the student groups may choose their own solutions. After students have made their decisions read the actual decision provided. Students can then see how their decision compared with one made by a real company actually confronted with the same situation.

6. Conclude with the following summary questions:

- What differences, if any, existed between the decisions made by company employees and community members? How can you account for the differences or similarities in their decisions?
- How did your group arrive at the criteria used for rating decisions presented to you? How did you reconcile differing opinions?
- Why is it essential for businesses to understand the point of view of community members when deciding questions of product safety and environmental issues?
- What factors must businesses consider when making decisions?
- Why is "corporate image" important to a business' success?

# Company Decisions

## Answers for Real Cases Issues/Concerns #7, 8, 9, 10

**ISSUE/CONCERN # 7**
**Company Decision**

*Procter & Gamble Chose Option 2 in marketing Liquid Cascade. Although the risk of harm was very small, for an added margin of safety, the product was packaged with a twist-and-turn child-resistant cap. Some consumers found the cap inconvenient, but in weighing the risks against the benefits of additional consumer acceptance, Procter & Gamble decided consumer safety was more important than convenience.*

**ISSUE/CONCERN # 8**
**Company Decision**

*Procter & Gamble had heard people complain of skin sensitivity to clothing laundered in scented detergents. Although research indicated the number of people with such sensitivity was small, it was apparent that many consumers wanted a product without perfume or dyes. After listening more carefully to consumers, the company decided to produce and test a product which would address the need consumers were expressing. The new product, CheerFree, has no perfumes or dyes and doesn't leave any residue on fabrics. The product sold more in the test market than the company had scheduled the plant to produce. Option 1 was the company's decision.*

**ISSUE/CONCERN # 9**
**Company Decision**

*Procter & Gamble was faced with this problem in West Germany with its liquid fabric softener, Lenor. The company's solution was to invent a refill pouch. Lenor is now sold as a concentrated product in small plastic pouches. The consumer pours the concentrate into an empty four liter bottle, fills it with water and shakes it to produce the finished product. The bottle is used over and over again. Although the new version is more inconvenient, consumers have responded favorably because they are doing something for the environment — and their own trash disposal costs. The new refill packages reduced the plastic waste by 80%. Option 3 was selected.*

**ISSUE/CONCERN # 10**
**Company Decision**

*Procter & Gamble decided its policy that its "products shall be safe for humans and the environment under conditions of intended use and foreseeable misuse" in addition to its policy that the company "shall meet the requirements of all relevant laws and regulations" prevented it from totally eliminating animal research. However, the company also decided it must be fully committed to the responsible use of animals. Scientists at Procter & Gamble aggressively pursue the development, validation and adoption of new test methods which: 1) eliminate the need for animals, 2) reduce the number of animals and 3) reduce distress for the animals. When alternative methods are developed, they are shared with other scientists and the appropriate regulatory agencies. Procter & Gamble's commitment to alternative development has paid off — over the past five years, P&G's use of animals for personal care and household product safety testing is down a full 80%. The company remains committed to continual leadership and progress in alternative development.*

# Company Employee Roles

## Manager, Sales Division

You are in charge of your company's sales personnel. Your goal is to maximize sales by increasing orders from your current customers and by adding new accounts. New or improved products always help your sales volume and your personal income. Your busy schedule calls for a great deal of travel leaving little time for community involvement.

## Manager, Research and Development Division

You are in charge of product research and development activities. Your job is to design new products and improve upon existing ones. Product safety is one of your major concerns when developing and improving products. You are in close contact with government agencies involved with safety issues. Educated and trained as a scientist, you are very interested in chemicals and their impact on humans and the environment.

## President

You are the president of a large manufacturing company. You are responsible to the board of directors and the stockholders. The company's profits are your first and major concern. Your task is to maintain or increase the profitability of your company.

## Toxicologist

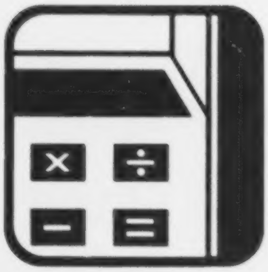
You are the chief toxicologist for your company. Your job is to test and evaluate products and their ingredients to determine their safety and effectiveness. You work closely with government agencies such as the Food and Drug Administration. You hold a Ph.D. degree in toxicology and are widely respected in your field. You take great pride in your company's outstanding product safety record.

## Customer Service Telephone Agent

Your job is to answer the company's toll free telephone line and respond to consumers' complaints and questions. Additionally, you collect and coordinate the information customers give to your company regarding its products. Both positive and negative evaluations of products are made by customers. Consumers also ask questions concerning proper use and improper use of products. Your company uses this information to evaluate products and packaging. You are very aware that if consumers do not like your products they won't continue to buy them. You know from experience if the slightest thing is wrong with a product, consumers will call to comment.

## Chief Financial Officer

Your job is to keep track of the financial condition of the company. You monitor departmental budgets and you want to keep costs down so your company can remain competitive. While you recognize the importance of developing new products, you look for ways to reduce spending on research whenever possible.



## Production Employee

You are employed by the company and realize that you have a good job compared with work you could find elsewhere. You are convinced that if you lost your job with the company for any reason, you and your family would have to move to a larger city for employment. Although you do not have much formal education, your hard work has been recognized through promotions and pay raises. Leaving this community would cause great emotional and financial hardship for you and your family.

## Data Entry Clerk

You are new to the company. You are responsible for entering data into a computer for inventory control. This is your first job out of high school. You are engaged to be married and you and your fiance plan to stay in this community and have a family. You are pleased to be working for such a highly respected company and hope you will be able to advance in the organization.

## Co-op Student

You attend a nearby university and are co-oping this semester at the company. You are learning a lot and enjoying your work. You hope to make a good impression so that after graduation you will be hired as a full time employee. You have been assigned to assist company scientists in evaluating the environmental impact of various packaging materials.

## Public Relations Specialist

You have worked for the company several years. Your main responsibility is to see that the company maintain a good public image. You have initiated a variety of programs to help the community, including educational assistance and a support group of company volunteers to work on a variety of community projects. You are proud that as a result of your programs, the company is generally viewed as a good corporate neighbor. You feel very strongly that the company should do nothing which might jeopardize the positive image you've worked so hard to establish.

# Community Members

### City Council Member

You are an elected official with two years to go in your existing term and plan to run for re-election. The theme of your last successful election campaign was "What's Good for Business is Good for our Community." Your economic development platform promised new jobs and better pay for community residents. You want more businesses to move into your community and the existing businesses to expand operations. You want your community to be known as a "friend of business."

### President of Local Environmental Organization

You are the president of the local branch of a national organization committed to a clean and safe environment. You have worked for many years to make businesses more responsible when it comes to product safety and environmental issues. You believe businesses have a financial and moral commitment to the areas in which they are located and to their consumers.

### Owner of Local Supermarket

As the owner of supermarket you think of the success of your business first. You have worked hard to watch your small grocery store grow into a large retail market. Recently your concern about product safety has been growing. You have heard reports of product tampering in other areas and wonder how you will maintain the safety of your merchandise. The cost of improved packaging might have a negative impact on your sales. Many of your customers work for the local manufacturing company.

### Editor of the Local Newspaper

As editor you feel a civic duty to express your point of view on the major issues of the day. Product safety and environmental issues top the list of local concerns. You are a strong believer in preserving the Earth for future generations. You have written several blistering editorials on the responsibility of business to maintain a healthy environment. When it comes to product safety, you have led the charge for reform in the use of cautionary labels.

### President of the Local Retail Merchants' Association

In this role you represent over fifty owners of local businesses. You realize that your community's economic well-being depends on the profitability of the local manufacturing company. You remember that several years ago widespread layoffs hit the company. Community merchants fell on hard times. Several, in fact, had to close, while almost all had to fire many of their workers. While you are concerned about environmental issues and the growth of your community, you are well aware that a decline at the local manufacturing plant could spell disaster for your community's economy.

### Retired Person

You are seventy years old, the former owner of a small retail business. You are in very good health and spend much of your time outdoors engaging in leisure activities you never had time for while working. While you were in business, you always felt compelled to be an active member of the community. You still feel this way — local businesses have a responsibility to the community in which they are located.

## Doctor at the local Medical Center

As a medical doctor, your first responsibility is to your patients. Like most medical professionals you have a concern for product safety and for environmental issues. You have heard that there might be some product safety and environmental issues surfacing that involve the local manufacturing company—your community's major employer. Remember, your first commitment is to health and safety.

## High School Student I

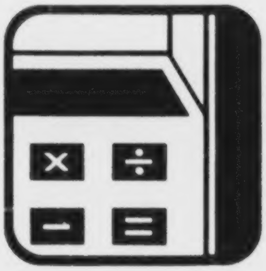
You are sixteen. You have studied about environmental issues both in science and in social studies classes. You are involved in a Student Action group which is planning a write-in campaign to your community's government to encourage them to begin a recycling program. You want to try to make a difference in your community. You plan to attend college and perhaps, eventually, run for public office.

## Homemaker

You have been married three years. You left your job to stay at home and care for your newborn baby. Your spouse works for the company. You spend what time you can doing volunteer work in the community. You are a member of the local environmental organization and also a consumer activist organization.

## High School Student II

You are eighteen and will graduate this year. You have worked at the local fast food restaurant for the last two years. You hope to get a job in a local print shop following graduation. You are aware that about 75 percent of the print shop's business is generated by the company. Both your mother and an uncle work for the company.



# Issues and Concerns

## ISSUE/CONCERN #1

The company is currently thinking about changing a major ingredient in one of its most popular household cleaning products. The new ingredient is cheaper to produce and its toxicity is at or below the level of the present ingredient. Use of the new ingredient would prove profitable for the company. The company could lower the price of the item, increase sales and increase profits or hold the price constant and earn more profit per unit sold.

Company scientists warn, however, that although the new ingredient has passed all safety requirements, they are still concerned with the long-term health effects of this proposed new product. What should the company do?

## ISSUE/CONCERN #2

Currently the company's operations are threatening the air quality of the local community. There is an 80% probability that an expenditure of two million dollars will eliminate the risk. If the two million is spent, the result will probably be a cutback in new product development. This may also mean a reduction in staff of approximately fifty jobs. Do you support the two million dollars expenditure?

## ISSUE/CONCERN #3

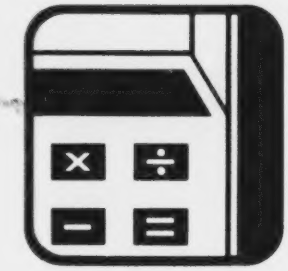
Your competitors' products have been tampered with. This has resulted in serious injury to a few consumers. Do you redesign and repackage your products using a tamper-resistant container? The cost of repackaging will either reduce your profits or raise the price of your products above that of your competition.

## ISSUE/CONCERN #4

In a cost reduction effort to increase dividends for your stockholders, you contemplate reducing your customer service department. The savings are substantial.

## ISSUE/CONCERN #5

Your research and development group has just invented a new drug that seems to cure a deadly disease. Few people contract the disease but when they do they usually die. The drug will not be made available in the United States for years because of the need for more testing and government agency approval. The cost of continuing the testing and development effort will be in the millions of dollars. Do you continue the product development effort?



## ISSUE/CONCERN #6

A person using your product failed to follow the directions carefully and caused herself physical discomfort. She called the customer service department and voiced her concern. She said the directions were not clear and she didn't realize she could hurt herself with your product if misused. Do you remove all of the products from the market? Should you place more explicit instructions in and on the boxes? The cost for changing the label is one million dollars.

# Issues and Concerns - Real Cases

## ISSUE/CONCERN # 7

Your company produces a granular automatic dishwasher detergent. You decide to introduce a liquid version of your product. For the product to work effectively, it must contain an ingredient which has the potential of being harmful if ingested. You have reduced this possibility by making the product emetic — that is, it will cause anyone who swallows it to vomit before enough can be ingested to cause harm. However, the liquid form makes it easier to swallow than granules, so there is a slight chance a child could swallow enough to cause harm. You know that dishwashing products are often stored under the kitchen sink within easy reach of children.

### Option 1

Rely on your safety testing and the emetic qualities of the product. The chances of harm occurring are slim. No other manufacturer of liquid dishwashing detergents offers any additional protection.

### Option 2

Market the product with a child-resistant cap. You know that a number of consumers will find this inconvenient. However, you feel even though the potential danger is slight, it is worth causing some inconvenience to reduce the risk even further.

### Option 3

Produce a product which contains no ingredients which would be harmful if ingested. Such a product would not be as effective in cleaning dishes and hence would probably not sell well. However, you would have a product that is both safe and convenient to use.

## ISSUE/ CONCERN # 8

Your company produces a wide variety of laundry detergents. All of your products are scented. Years of consumer research has indicated the majority of consumers prefer scented products for washing their laundry. Further, your scented products have been thoroughly tested to make sure they are safe for the skin. You have heard some consumers complain that they are sensitive to scented detergents and express a wish for a perfume free and dye free laundering product. However, you feel sure the number of people actually sensitive to scented laundry detergent is too small to warrant the cost of producing a new product to meet this need. You have years of experience which supports the position that only a product which has mass appeal can create enough profits to justify producing it. Should you produce a perfume free, dye free detergent?

### Option 1

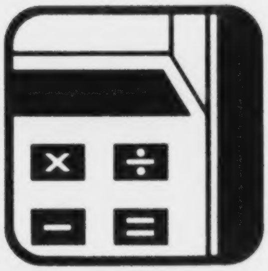
Create a perfume and dye free product designed to leave no residue on fabrics and test it in limited markets. If it meets consumers needs and earns a profit, consider producing it for the national market even though the total volume is not as large as one of your leading brands.

### Option 2

Launch a massive advertising and public relations campaign stressing the safety of current scented products.

### Option 3

Rely on history and experience and stick with what has worked in the past. Since the majority of consumers prefer scented products and products that have wide appeal create more profits, continuing to market only the detergents you currently produce will make sufficient profits without risking the high cost of producing and promoting a new brand.



## ISSUE/CONCERN # 9

Your company sells liquid fabric softener in West Germany. Germany is a densely populated country and the population has a strong interest in environmental concerns. Fabric softeners have become a target of environmental groups because their big plastic bottles are very visible in the garbage. Additionally, in Germany people must rent garbage cans from the city and the larger the can the more it costs. Empty fabric softener bottles take up considerable space in the garbage cans. People concerned with the environment and with the cost of waste disposal have stopped buying liquid fabric softeners and your sales volume and profits have dropped significantly. What do you do?

### Option 1

Accept the fact that sales of this product will probably continue to fall. Raising prices may help in reducing your losses.

### Option 2

Launch a publicity campaign to confront the environmentalists. You know the products you sell are safe and that your company has invested millions in research to make sure its products are compatible with the environment.

### Option 3

Look for an innovative way to enable consumers to continue to purchase and use liquid fabric softeners without contributing so much to solid waste.

## ISSUE/CONCERN #10

Your company is committed to producing products which are safe for humans and the environment when they are used as intended and even for foreseeable misuse (for example, if accidentally swallowed or splashed in the eyes). Scientists and government leaders agree that it is not possible today to provide adequate safety and efficacy assurance without animal research. In fact, there are government requirements for safety assurance based on animal test data. There is widespread public concern about using animals for research. Some animal rights organizations are calling for a complete halt to animal testing. You care deeply about animal welfare, but want to be certain the products you sell are safe for consumers.

### Option 1

Eliminate all animal testing. This will considerably limit your ability to develop new products. You will only be able to use ingredients which previously have been found to be safe. Or, if you do use new ingredients or combinations of ingredients you will be compromising the safety of your products.

### Option 2

Ignore the issue entirely and continue to use animals in research as you have in the past. This way you know your products will be safe.

### Option 3

Are there other alternatives? Is there a way to balance the need for products which are safe for humans with the concerns of those who feel animals should not be used in research? What would you do?

# Criteria and Evaluation Sheet

**ISSUE #** ________

**Description** ________________________________________

**Decision** ________________________________________

| **Criteria** | **Evaluation Score** |
|---|---|
| 1 ____________ | ______ |
| 2 ____________ | ______ |
| 3 ____________ | ______ |
| 4 ____________ | ______ |
| 5 ____________ | ______ |
| 6 ____________ | ______ |
| 7 ____________ | ______ |
| 8 ____________ | ______ |
| Total | |

**ISSUE #** ________

**Description** ________________________________________

**Decision** ________________________________________

| **Criteria** | **Evaluation Score** |
|---|---|
| 1 ____________ | ______ |
| 2 ____________ | ______ |
| 3 ____________ | ______ |
| 4 ____________ | ______ |
| 5 ____________ | ______ |
| 6 ____________ | ______ |
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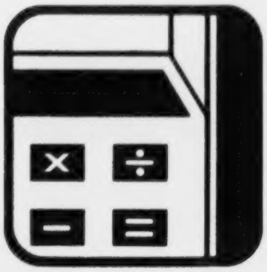
| 8 ____________ | ______ |
| Total | ______ |

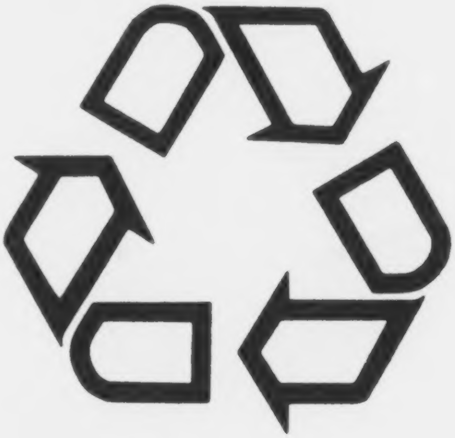


**Evaluation Scale**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Totally Unacceptable | Somewhat Unacceptable | Neither Unacceptable or Acceptable | Somewhat Acceptable | Completely Acceptable |

# Core Glossary

| | |
|---|---|
| **Consumers** | Individuals or groups of people willing and able to buy selected goods and services. |
| **Costs and Benefits** | A process of decision making in which people select the alternative(s) that maximize their satisfaction and/or minimize their unhappiness. |
| **Decision making** | The process of reaching a conclusion after consideration and acting upon that conclusion. |
| **Environment** | All external factors influencing the quality of life. |
| **Market** | An institutional place or arrangement that enables buyers and sellers to get together, establish a price and exchange goods and services. |
| **Producer** | One who transforms productive resources from something of lessor value to something of greater value. |
| **Production** | The process of deciding how to combine productive resources to produce goods and services consumers value and acting upon these decisions. |
| **Profits** | The total amount of money an individual or company receives from the sale of a good or service minus all costs of doing business. |
| **Resources** | Factors of production including land, labor, capital and entrepreneurship. |
| **Risks** | The chance of loss due to a particular event or decision. |
| **Scarcity** | The problem created by the limited availability of resources to produce goods and services and the unlimited desires for those goods and services. |



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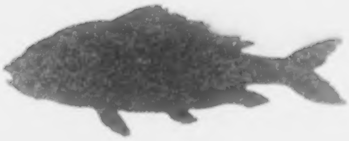
# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR SOCIAL STUDIES EDUCATORS

PROCTER & GAMBLE
EDUCATIONAL SERVICES



# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR SOCIAL STUDIES EDUCATORS

PROCTER & GAMBLE
EDUCATIONAL SERVICES

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We hope you find DECISIONS ABOUT PRODUCT SAFETY a useful and helpful addition to your classes.

Patti J. Shively
Manager, Educational Services
Procter & Gamble Company

# Decisions About Product Safety

## Introduction

The Social Studies component to the complete unit entitled DECISIONS ABOUT PRODUCT SAFETY is designed to increase student awareness of the growing concern among citizens and the corresponding involvement of the government regarding product safety. Businesses today are regulated to differing degrees by various government agencies. These agencies establish guidelines for business decisions in the areas of product development, packaging, promotion and safety.

Currently over forty independent governmental agencies exist to monitor and evaluate business activity within the United States and abroad. Approximately 40% of these agencies directly influence businesses' production decisions with over one-third of these directly related to product safety. The trend seems to be to increase not only the number of agencies but also the budgets and size of the existing ones. This circumstance adds to the complexities of the business decision making environment. A growing number of concerns and costs involving regulation must be weighed before good economic decisions can be made.

Government involvement in the economy is not new. The writers of the Constitution of the United States realized that the central government could and should pursue certain activities for the good of the economy. Establishing the conditions for a market system to be successful was one major role of government. The Constitution protects private property, facilitates trade through the creation of a national currency, interstate commerce rights and contract enforcement. Incentives are provided for enterprise with patent laws and the freedom of entry and exit to and from business. These are some of the areas where government plays an important role in the economy. And, the role is increasing as society becomes more complex.

The Social Studies component of the DECISIONS ABOUT PRODUCT SAFETY unit is designed to be completed in four class periods with appropriate homework activities completed by the students. The material is designed to be flexible — you may choose to use only parts of the activities in this section or to use them with activities from other sections of the unit.

### OVERVIEWS

**A Foundation for Doing Business.** Students review the U.S. Constitution and find that many of the opportunities for business were established by our founding fathers as they wrote the Constitution. A further understanding of government's role in business is obtained by researching current political activities and determining their influence on business.

**Growing Government.** Students discover that the size and cost of governmental agencies are growing. As many of these agencies directly and indirectly influence business decisions, business decision making is becoming more complex. Students research an agency of their choice and write a paper on its role and how it has grown.

**It's All in a Label.** Students discover how business and governmental agencies work together to make products better and safer. Through an analysis of product labels past and present, students will see how directions, safeguards and ingredients have changed to make products better and safer.

**Products Around the World.** Students survey their homes to determine the types and number of foreign made products they have purchased as a family. By reporting to the class and making a world map, the concept of an international marketplace is introduced.

# A Foundation for Doing Business

## Reviewing the U. S. Constitution

### Overview

Students review the U.S. Constitution and find that many of the opportunities for business were established by our founding fathers as they wrote the Constitution. A further understanding of government's role in business is obtained by researching current political activities and determining their influence on business.

The Constitution of the United States sets the stage for a special type of society and economy. Many parts of the document influence, either directly or indirectly, how we conduct business. In addition to those clauses which deal with matters obviously related to business and the economy — e.g., regulation of commerce, coining of money, promotion of science, collection of taxes, etc. — the Constitution indirectly provides for the regulation of business by giving the legislature the power to make laws that are "necessary and proper" for executing the powers granted it. Administrative agencies are created by law to do just that. The administrators or commissioners who head government agencies are appointed by the President under the Appointment Clause of Article II of the Constitution. From the basic language in the Constitution which laid the foundation for how we conduct business, government involvement in business has grown in size and in scope over the years. Consideration of the rules and regulations of government agencies is an essential part of the business decision making process.

### Time required

One class period

### Concepts covered in this lesson

Culture
Government
Regulatory agencies
Laws
Costs and Benefits
Taxation
Decision making

### Objectives

Students who participate in this activity should be able to:

1. Understand that the government has been given the role of regulator of some aspects of business activity including product safety.

### Materials

A copy of the U. S. Constitution for each student

### Teaching strategies

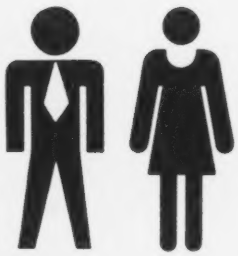
The activities in this Social Studies component expand on the decision making process and ideas presented in the Core material. Specifically, the need to include regulations and requirements from outside organizations into the business decision making process is recognized and discussed.

1. To help students realize decision makers in government have an impact on the country's economy, ask them to reread the U.S. Constitution. Distribute a copy of the Constitution to each student. Ask them to pay particular attention to the highlighted areas. These are Articles and Sections that may influence business and the economy. As suggested in the Overview, many parts of the document directly or indirectly influence how we conduct business, how we trade between states, how stable we are socially and politically, our freedom, etc. Ask students in what way the various Articles or Sections have influenced business. For example, Article I, Section 8 provides

for ownership of inventions and writings. This may be interpreted as an incentive for scientists, businesses and inventors to conduct research, develop new products and help the economy grow. Section 10 establishes a single currency. This helps make exchange easier and allows people to specialize their labor and compete with one another.

2. Ask the students to report their findings to the class. Discuss why the writers of the U.S. Constitution saw fit to include these features. Stress the historical environment of the times and the experiences the writers had with other types of governments. Discuss the types of people who made up the Constitutional Convention membership. Note that, for the most part, these were men of property and they had incentives to establish a system with certain characteristics.

3. As homework, direct the students to read the newspaper or a current periodical or watch the national evening news on television. Their assignment is to identify at least one government activity or decision that impacts or will impact the economy. Have students link the news article to the appropriate section of the Constitution. (For example, an article of foreign trade would be related to the third paragraph of Section 8 regarding the regulation of commerce with foreign nations.) Items selected could include such subjects as more regulations regarding pollution emissions, a change in an international trade agreement, a decision to restrict the use of a chemical, etc.. Discuss the students' findings the following day by asking them to report briefly to the class. Conclude that people in government make decisions which impact our lives.



# CONSTITUTION OF THE UNITED STATES OF AMERICA

## PREAMBLE

WE THE PEOPLE of the United States, in order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defence, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this CONSTITUTION for the United States of America.

***Explanatory note:***
*Bracketed numbers were inserted by the editor. Brackets in the body of the document indicate the enclosed portion was superseded or modified by amendment.*

## ARTICLE I

## LEGISLATIVE DEPARTMENT

### Section 1. [Legislative powers vested in Congress.]

All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

### Sec. 2. [House of Representatives.]

[1.] The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for Electors of the most numerous Branch of the State Legislature.

[2.] No Person shall be a Representative who shall not have attained to the Age of Twenty five Years, and been seven Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State in which he shall be chosen.

[3.] [Representatives and direct Taxes shall be apportioned among the several States which may be included within this Union, according to their respective Numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three fifths of all other persons.] The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct. The Number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at Least one Representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to chuse three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

[4.] When vacancies happen in the Representation from any State, the Executive Authority thereof shall issue Writs of Election to fill such Vacancies.

[5.] The House of Representatives shall chuse their Speaker and other Officers; and shall have the sole Power of Impeachment.

### Sec. 3. [Senate.]

[1.] [The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof, for six Years; and each Senator shall have one vote.]

[2.] Immediately after they shall be assembled in Consequence of the first Election, they shall be divided as equally as may be into three Classes. The Seats of the Senators of the first Class shall be vacated at the Expiration of the second Year, of the second Class at the Expiration of the fourth Year, and the third Class at the Expiration of the sixth Year, so that one third may be chosen every second Year; [and if Vacancies happen by Resignation, or otherwise, during the Recess of the Legislature of any State, the Executive thereof may make temporary Appointments until the next Meeting of the Legislature, which shall then fill such Vacancies].

[3.] No Person shall be a Senator who shall not have attained to the Age of thirty years, and been nine Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State for which he shall be chosen.

[4.] The Vice President of the United States shall be President of the Senate, but shall have no Vote, unless they be equally divided.

[5.] The Senate shall chuse their other Officers, and also a President pro tempore, in the Absence of the Vice President, or when he shall exercise the Office of President of the United States.

[6.] The Senate shall have the sole Power to try all Impeachments. When sitting for that Purpose, they shall be on Oath or Affirmation. When the President of the United States is tried, the Chief Justice shall preside: and no Person shall be convicted without the Concurrence of two thirds of the Members present.

[7.] Judgment in Cases of Impeachment shall not extend further than to removal from Office, and disqualification to hold and enjoy any Office of honor, Trust or profit under the United States: but the Party convicted shall nevertheless be liable and subject to Indictment, Trial, Judgment and Punishment, according to Law.

### Sec. 4. [Election of members--Sessions.]

[1.] The Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by Law make or alter such Regulations, except as to the Places of chusing Senators.

[2.] The Congress shall assemble at least once in every Year, and such Meeting shall be on the [first Monday in December], unless they shall by Law appoint a different Day.

### Sec. 5. [Organization--Proceedings--Adjournment.]

[1.] Each House shall be the Judge of the Elections, Returns and Qualifications of its own Members, and a Majority of each shall constitute a Quorum to do Business; but a smaller Number may adjourn from day to day, and may be authorized to compel the Attendance of absent Members, in such Manner, and under such Penalties as each House may provide.

[2.] Each House may determine the Rules of its Proceedings, punish its Members for disorderly Behavior, and, with the Concurrence of two thirds, expel a Member.

[3.] Each House shall keep a Journal of its Proceedings, and from time to time publish the same, excepting such Parts as may in their Judgment require Secrecy; and the Yeas and Nays of the Members of either House on any question shall, at the Desire of one fifth of those Present, be entered on the Journal.

[4.] Neither House, during the Session of Congress, shall, without the Consent of the other, adjourn for more than three days, nor to any other Place than that in which the two Houses shall be sitting.

### Sec. 6. [Compensation--Privileges--Holding other office.]

[1.] The Senators and Representatives shall receive a Compensation for their Services, to be ascertained by Law, and paid out of the Treasury of the United States. They shall in all Cases, except Treason, Felony and Breach of the Peace, be privileged from Arrest during their Attendance at the Session of their Respective Houses, and in going to and returning from the same; and for any

Speech or Debate in either House, they shall not be questioned in any other Place.

[2.] No Senator or Representative shall, during the Time for which he was elected, be appointed to any civil Office under the Authority of the United States, which shall have been created, or the Emoluments whereof shall have been encreased during such time; and no Person holding any Office under the United States, shall be a Member of either House during his Continuance in Office.

## Sec. 7. [Bills and resolutions--Veto.]

[1.] All Bills for raising Revenue shall originate in the House of Representatives; but the Senate may propose or concur with Amendments as on other Bills.

[2.] Every bill which shall have passed the House of Representatives and the Senate, shall, before it become a Law, be presented to the President of the United States; If he approve he shall sign it, but if not he shall return it, with his Objections to that House in which it shall have originated, who shall enter the Objections at large on their Journal, and proceed to reconsider it. If after such Reconsideration two thirds of that House shall agree to pass the Bill, it shall be sent, together with the Objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a Law. But in all such Cases the Votes of both Houses shall be determined by Yeas and Nays, and the Names of the Persons voting for and against the Bill shall be entered on the Journal of each House respectively. If any Bill shall not be returned by the President within ten Days (Sundays excepted) after it shall have been presented to him, the Same shall be a Law, in like Manner as if he had signed it, unless the Congress by their Adjournment prevent its Return, in which Case it shall not be a law.

[3.] Every Order, Resolution, or Vote to which the Concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States; and before the Same shall take Effect, shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the Rules and Limitations prescribed in the Case of a Bill.

## Sec. 8. [Powers of Congress.]

**[1.] The Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises, to pay the Debts and provide for the common Defence and general Welfare of the United States; but all Duties, Imposts and Excises shall be uniform throughout the United States.**

**[2.] To borrow Money on the credit of the United States.**

**[3.] To regulate Commerce with foreign Nations, and among the several States, and with the Indian tribes.**

**[4.] To establish an uniform Rule of Naturalization and uniform Laws on the subject of Bankruptcies throughout the United States.**

**[5.] To coin Money, regulate the Value thereof, and of foreign Coin, and fix the Standard of Weights and Measures.**

**[6.] To provide for the Punishment of counterfeiting the Securities and current Coin of the United States.**

**[7.] To establish Post Offices and post Roads.**

**[8.] To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.**

[9.] To constitute Tribunals inferior to the supreme Court.

[10.] To define and punish Piracies and Felonies committed on the high Seas, and Offences against the Law of Nations.

[11.] To declare War, grant Letters of Marque and Reprisal, and make Rules concerning Captures of Land and Water.

[12.] To raise and support Armies, but no Appropriation of Money to that Use shall be for a longer Term than two Years.

[13.] To provide and maintain a Navy.

[14.] To make Rules for the Government and Regulation of the land and naval Forces.

[15.] To provide for calling forth the Militia to execute the Laws of the Union, suppress Insurrections and repel Invasions.

[16.] To provide for organizing, arming, and disciplining the Militia, and for governing such Part of them as may be employed in the Service of the United States, reserving to the States respectively, the Appointment of the Officers, and the Authority of training the Militia according to the discipline prescribed by Congress.

[17.] To exercise exclusive Legislation in all Cases whatsoever, over such District (not exceeding ten Miles square) as may, by Cession of particular States, and the Acceptance of Congress, become the Seat of the Government of the United States, and to exercise like Authority over all Places purchased by the Consent of the Legislature of the States in which the Same shall be, for the Erection of Forts, Magazines, Arsenals, Dock-Yards, and other needful Buildings. And,

**[18.] To make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers, and all other Powers vested by this Constitution in the Government of the United States, or in any Department or Officer thereof.**

### Sec. 9. [Powers denied Congress.]

[1.] The Migration or Importation of such Persons as any of the States now existing shall think proper to admit, shall not be prohibited by the Congress prior to the Year one thousand eight hundred and eight, but a Tax or duty may be imposed on such Importation, not exceeding ten dollars for each Person.

[2.] The Privilege of the Writ of Habeas Corpus shall not be suspended, unless when in Cases of Rebellion or Invasion the public Safety may require it.

[3.] No Bill of Attainder or ex post facto Law shall be passed.

**[4.] No Capitation, or other direct, Tax shall be laid, unless in Proportion to the Census or Enumeration herein before directed to be taken.**

**[5.] No Tax or Duty shall be laid on Articles exported from any State.**

**[6.] No Preference shall be given by any Regulation of Commerce or Revenue to the Ports of one State over those of another: nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another.**

**[7.] No Money shall be drawn from the Treasury, but in Consequence of Appropriations made by Law; and a regular Statement and Account of the Receipts and Expenditures of all public Money shall be published from time to time.**

[8.] No Title of Nobility shall be granted by the United States: and no Person holding any Office of Profit or Trust under them, shall, without the Consent of the Congress, accept of any present, Emolument, Office, or Title, of any kind whatever, from any King, Prince, or foreign State.

### Sec. 10. [Powers denied the states.]

[1.] No State shall enter into any Treaty, Alliance, or Confederation; grant Letters of Marque and Reprisal; **coin Money; emit Bills of Credit; make any thing but gold and silver Coin a Tender in Payment of Debts;** pass any Bill of Attainder, ex post facto Law, **or Law impairing the Obligation of Contracts,** or grant any Title of Nobility.

**[2.] No State shall, without the Consent of the Congress, lay any Imposts of Duties on Imports or Exports, except what may be absolutely necessary for executing its inspection Laws; and the net Produce of all Duties and Imposts, laid by any State on Imports or Exports, shall be for the Use of the Treasury of the United States; and all such Laws shall be subject to Revision and Controul of the Congress.**

[3.] No State shall, without the Consent of Congress, lay any Duty of Tonnage, keep Troops, or Ships of War in time of Peace, enter into any Agreement or Compact with another State, or with a foreign Power, or engage in War, unless actually invaded, or in such imminent Danger as will not admit of delay.

## ARTICLE II

## EXECUTIVE DEPARTMENT

### Section 1. [The President.]

[1.] The executive Power shall be vested in a President of the United States of America. He shall hold his Office during the Term of four Years, and, together with the Vice President, chosen for the same Term, be elected, as follows:

[2.] Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress: but no Senator or Representative, or Person holding an Office of Trust or Profit under the United States, shall be appointed an Elector.

[3.] [The Electors shall meet in their respective States, and vote by Ballot for two Persons, of whom one at least shall not be an Inhabitant of the same State with themselves. And they shall make a List of all the Persons voted for, and of the Number of Votes for each; which List they shall sign and certify, and transmit sealed to the Seat of the Government of the United States, directed to the President of the Senate. The President of the Senate shall, in the Presence of the Senate and House of Representatives, open all the Certificates, and the Votes shall then be counted. The Person having the greatest Number of Votes shall be President, if such Number be a Majority of the whole Number of Electors appointed; and if there be more than one who have such Majority, and have an equal Number of Votes, then the House of Representatives shall immediately Chuse by Ballot one of them for President; and if no Person have a Majority, then from the five highest on the List the said House shall in like manner Chuse the President. But in Chusing the President, the Votes shall be taken by States, the Representation from each State having one Vote; A quorom for this Purpose shall consist of a Member or Members from two thirds of the States, and a Majority of all the States shall be necessary to a Choice. In every Case, after the Choice of the President, the Person having the greatest Number of Votes of the Electors shall be the Vice President. But if there should remain two or more who have equal Votes, the Senate shall Chuse from them by Ballot the Vice President.]

[4.] The Congress may determine the Time of Chusing the Electors, and the Day on which they shall give their Votes; which Day shall be the same throughout the United States.

[5.] No Person except a natural born Citizen, or a Citizen of the United States, at the time of the Adoption of this Constitution, shall be eligible to the Office of President; neither shall any Person be eligible to that Office who shall not have attained to the Age of thirty five Years, and been fourteen Years a Resident within the United States.

[6.] In Case of the Removal of the President from Office, or of his Death, Resignation, or Inability to discharge the Powers and Duties of the said Office, the Same shall devolve on the Vice President, and the Congress may by Law provide for the Case of Removal, Death, Resignation or Inability, both of the President and Vice President, declaring what Officer shall then act as President, and such Officer shall act accordingly, until the Disability be removed, or a President shall be elected.

[7.] The President shall, at stated Times, receive for his Services, a Compensation, which shall neither be encreased nor diminished during the Period for which he shall have been elected, and he shall not receive within that Period any other Emolument from the United States, or any of them.

[8.] Before he enter on the Execution of his Office, he shall take the following Oath or Affirmation: - "I do solemnly swear (or affirm) that I will faithfully execute the Office of President of the United States, and will to the best of my Ability, preserve, protect and defend the Constitution of the United States."

### Sec. 2. [Commander-in-Chief--Pardons--Treaties--Appointment of officers.]

[1.] The President shall be Commander in Chief of the Army and Navy of the United States, and of the Militia of the several States, when called into the actual Service of the United States; he may require the Opinion, in writing, of the principal Officer in each of the executive Departments, upon any Subject relating to the Duties of their respective Offices, and he shall have power to grant Reprieves and Pardons for Offenses against the United States, except in Cases of Impeachment.

[2.] He shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur; and he shall nominate, and by and with the Advice and Consent of the Senate, shall appoint Ambassadors, other public Ministers and Consuls, Judges of the Supreme Court, and all other Officers of the United States, whose Appointments are not herein otherwise provided for, and which shall be established by Law: but the Congress may by Law vest the Appointment of such inferior Officers, as they think proper, in the President alone, in the Courts of Law, or in the Heads of Departments.

[3.] The President shall have Power to fill up all Vacancies that may happen during the Recess of the Senate, by granting Commissions which shall expire at the End of their next Session.

### Sec. 3. [Miscellaneous powers and duties.]

He shall from time to time give to the Congress Information of the State of Union, and recommend to their Consideration such Measures as he shall judge necessary and expedient; he may, on extraordinary Occasions, convene both Houses, or either of them, and in Case of Disagreement between them, with Respect to the Time of Adjournment, he may adjourn them to such Time as he shall think proper; he shall receive Ambassadors and other public Ministers; he shall take Care that the Laws be faithfully executed, and shall Commission all the Officers of the United States.

### Sec. 4. [Impeachment.]

The President, Vice President and all civil Officers of the United States, shall be removed from Office on Impeachment for, and Conviction of, Treason, Bribery, or other high Crimes and Misdemeanors.

## ARTICLE III

## JUDICIAL DEPARTMENT

### Section 1. [Judicial power.]

The judicial Power of the United States, shall be vested in one supreme Court, and in such inferior Courts as the Congress may from time to time ordain and establish. The Judges, both of the supreme and inferior Courts, shall hold their Offices during good Behavior, and shall, at stated Times, receive for their Services, a Compensation, which shall not be diminished during their Continuance in Office.

### Sec. 2. [Extent of judicial power--Supreme Court--Trial and places of trial.]

[1.] The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, and Treaties made, or which shall be made, under their Authority; —to all Cases affecting Ambassadors, other public Ministers and Consuls; —to all Cases of admiralty and maritime Jurisdiction; —to Controversies to which the United States shall be a Party; —to Controversies between two or more States; —between a State and Citizens of another State; —between Citizens of different States; —between Citizens of the same State claiming Lands under Grants of different States, and between a State, or the Citizens thereof, and foreign States, Citizens or Subjects.

[2] In all Cases affecting Ambassadors, other public Ministers and Consuls, and those in which a State shall be Party, the supreme Court shall have original Jurisdiction. In all the other Cases before mentioned, the supreme Court shall have appellate Jurisdiction, both as to Law and Fact, with such Exceptions, and under such Regulations as the Congress shall make.
3.] The Trial of all Crimes, except in Cases of Impeachment, shall be by Jury; and such Trial shall be held in the State where the

said Crime shall have been committed; but when not committed within any State, the Trial shall be at such Place or Places as the Congress may by Law have directed.

### Sec. 3. [Treason, proof and punishment.]

[1.] Treason against the United States, shall consist only in levying War against them, or in adhering to their Enemies, giving them Aid and Comfort. No Person shall be convicted of Treason unless on the Testimony of two Witnesses to the same overt Act, or on Confession in open Court.

[2.] The Congress shall have Power to declare the Punishment of Treason, but no Attainder of Treason shall work Corruption of Blood, or Forfeiture except during the Life of the Person attainted.

## ARTICLE IV

## STATE AND TERRITORIAL RELATIONS

### Section 1. [Full faith and credit to records and judicial proceedings of states.]

Full Faith and Credit shall be given in each State to the public Acts, Records, and judicial Proceedings of every other State. And the Congress may by general Laws prescribe the Manner in which such Acts, Records and Proceedings shall be proved, and Effect thereof.

### Sec. 2. [Privileges and immunities-Fugitives from justice and service.]

[1.] The Citizens of each State shall be entitled to all Privileges and Immunities of Citizens in the several States.

[2.] A Person charged in any State with Treason, Felony, or other Crime, who shall flee from Justice, and be found in another State, shall on Demand of the executive Authority of the State from which he fled, be delivered up, to be removed to the State having Jurisdiction of the Crime.

[3.] No Person held to Service or Labour in one State, under the Laws thereof, escaping into another, shall, in Consequence of any Law or Regulation therein, be discharged from such Service or Labour, but shall be delivered up on Claim of the Party to whom such Service or Labour may be due.

### Sec. 3. [Admission of states--Rules and regulations respecting the territory and property of the United States.]

[1.] New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the Jurisdiction of any other State; nor any State be formed by the Junction of two or more States, or Parts of States, without the Consent of the Legislatures of the States concerned as well as of the Congress.

[2.] The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State.

### Sec. 4 [Guaranty of republican form of government and against invasion.]

The United States shall guarantee to every State in this Union a Republican Form of Government, and shall protect each of them against Invasion; and on Application of the Legislature, or of the Executive (when the Legislature cannot be convened) against domestic Violence.

## ARTICLE V

## AMENDMENT

### [Mode of amendment.]

The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose Amendments to this Constitution, or, on the Application of the Legislatures of two thirds of the several States, shall call a Convention for proposing Amendments, which, in either Case, shall be valid to all Intents and Purposes, as Part of this Constitution, when ratified by the Legislatures of three fourths of the several States, or by Conventions in three fourths thereof, as the one or the other Mode of Ratification may be proposed by the Congress; Provided that no Amendment which may be made prior to the Year One thousand eight hundred and eight shall in any Manner affect the first and fourth Clauses in the Ninth Section of the first Article; and that no State, without its Consent, shall be deprived of its equal Suffrage in the Senate.

## ARTICLE VI

## MISCELLANEOUS PROVISIONS

### [Assumption of public debt--Supreme Law--Oath of office--Religious tests prohibited.]

[1.] All Debts contracted and Engagements entered into, before the Adoption of this Constitution, shall be as valid against the United States under this Constitution, as under the Confederation.

[2.] This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

[3.] The Senators and Representatives before mentioned, and the Members of the several State Legislatures, and all executive and judicial Officers, both of the United States and of the several States, shall be bound by Oath or Affirmation, to support this Constitution; but no religious Test shall ever be required as a Qualification to any Office or public Trust under the United States.

## ARTICLE VII

## ADOPTION

### [Ratification--Attestation.]

The Ratification of the Conventions of nine States, shall be sufficient for the Establishment of this Constitution between the States so ratifying the Same.

Done in Convention by the Unanimous Consent of the States present the Seventeenth Day of September in the Year of Our Lord one thousand seven hundred and Eighty seven and of the Independence of the United States of America the Twelfth.

# Growing Government

## Reviewing the Budgets

### Overview

Students discover that the size and cost of governmental agencies are growing. As many of these agencies directly or indirectly influence business decisions, business decision making is becoming more complex. Students research an agency of their choice and write a paper on its role and how it has grown.

People are becoming more concerned about health, resource use, pollution control and abatement, water quality, energy and product quality. These concerns have caused politicians to include these issues in their platforms and work to develop programs in these areas when they take office. Often, agencies are formed or old ones expanded to deal with such issues. Agencies typically gather data on the subject, suggest courses of action, establish rules and regulations and enforce the rules and regulations. As issues grow in number and magnitude, the number and size of the agencies also grows. One measure of an agency's expansion is the growth of its budget.

### Time required

One class period

### Concepts covered in this lesson

Government
Regulatory agencies
Laws
Costs and Benefits
Product safety
Taxation
Decision making

### Objectives

Students who participate in this activity should be able to:

1. Realize product safety is becoming an increasing concern of consumers and businesses.

2. Understand that government agencies have been given the role of regulator of some aspects of business activity including product safety.

3. Understand regulation provides both a cost and a benefit to society.

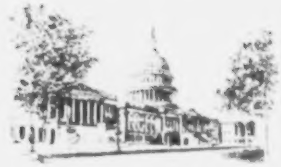
### Materials

AGENCY BUDGET DATA SHEET for each group of 4-6 students.

### Teaching strategies

The activities in this Social Studies component stress analysis of data, reaching conclusions, gathering information and writing a report. The students should be aware of the growing role of government in many aspects of our economy and business decision making. Regulation by government agencies adds another dimension to decision making as well as cost and benefit calculations.

1. Divide the class into discussion groups of 4-6 students. Distribute the AGENCY BUDGET DATA SHEET to each group. Direct each group to review the information and reach as many conclusions regarding the government, regulation, people's attitudes toward business and government and the economy as they can. If students need help getting started, ask them to consider which budgets have increased. Why some more than others?



Students may brainstorm as many ideas as possible. The groups may suggest, for example, that the size and cost of governmental agencies have increased, people must be more concerned about the environment, health, resources, energy, etc., more information must be known about the issues the agencies are involved with and more rules and regulations must now exist. Remind them that inflation has also played a part in the increasing numbers.

Special emphasis should be given to the growth of governmental agencies that influence business decision making, for example, the Environmental Protection Agency, Food and Drug Administration, Federal Trade Commission, Occupational Safety and Health Administration, and others.

2. Following the students' brainstorming, ask the students to address the question of why these things are happening? For example, why have various agencies that deal with safety and health issues grown? Why are we more concerned today about energy, resources, water quality and pollution than years ago? Students should see that many of these concerns relate to resources which are scarce and very important for life. As the population grows, greater and greater pressure is being placed upon our planet's ability to support life now and in the future. As problems grow in magnitude and relative importance, they become more visible and consequently more people become concerned and seek solutions.

3. As homework, direct the students to select a governmental agency of their own choosing from the AGENCY BUDGET DATA SHEET, or one listed in the latest World Almanac, and write a one to two-page report. The report should include the early beginnings of the agency, why it was created, what groups of people supported the establishment of the agency, what groups were opposed to it, if any, and how the agency works with business to influence production decisions.

Information is available in most libraries from sources such as encyclopedias, periodicals and books. (One good resource is the Federal Regulatory Directory published by Congressional Quarterly Inc.) It is suggested that students interview people in their community for further information. Pharmacists are a good source of information on the Food and Drug Administration as are grocery store owners. Someone from a local business could be interviewed regarding occupational safety, pollution control and product safety. Information pertaining to resource management can be obtained from the Department of Natural Resources or the local game warden. The County Extension Office is a good source of information on the U. S. Department of Agriculture.

4. Collect the reports and post on the bulletin board for student reading and reference. It is recommended that the bulletin board take the form of a timeline with the reports placed near the beginning year of the agency. This approach will demonstrate a growing number of agencies over the past several years.

STUDENT
ACTIVITY

# Agency Budget Data Sheet

## Purpose

Agency Budget Data over time provides information regarding the relative importance people place on certain activities. Society is more willing to increase budgets for something it values than for something it does not.

## Directions

Review the data listed below. As a group, brainstorm as many possible conclusions as you can based upon the data. Be prepared to share your ideas with the class.

### Costs of Selected Federal Regulatory Agencies (in millions of dollars)

| Agency | 1970 | 1975 | estimated 1980 | 1985 | 1990 |
|---|---|---|---|---|---|
| Environmental Protection Agency | $205 | $794 | $1360 | $1928 | $3623 |
| Department of Agriculture | 294 | 483 | 770 | 950 | 1090 |
| Food and Drug Administration | 80 | 207 | 334 | 437 | 625 |
| Drug Enforcement Administration | 2 | 12 | 13 | 18 | 28 |
| Occupational Safety and Health Administration | - | 97 | 191 | 220 | 267 |
| Nuclear Regulatory Commission | 64 | 148 | 396 | 445 | 451 |
| Federal Trade Commission | 21 | 39 | 66 | 66 | 74 |
| Federal Energy Regulatory Commission | 18 | 33 | 68 | 98 | 117 |

Source: Center for the Study of American Business, Washington University.
Derived from the Budget of the United States Government and related documents, various fiscal years.

TEACHER
RESOURCES

# It's All in a Label

## Reading Labels for Information

### Overview

Students discover how businesses and governmental agencies work together to make products better and safer. Through an analysis of product labels past and present, students will see how directions, safeguards and ingredients have changed to make products better.

Concern for safer products has grown as the size and complexity of our society has grown. The number of products and related ingredients is so vast the average consumer lacks sufficient knowledge concerning the proper use, disposal, potential misuse and potential hazards associated with certain products. Realizing this, government agencies require, and producers have provided, more and more information about products on labels and in directions.

### Time required

One class period

### Concepts covered in this lesson

Culture
Government
Regulatory agencies
Laws
Costs and Benefits
Risks
Product safety
Decision making

### Objectives

Students who participate in this activity should be able to:

1. Realize product safety is becoming an increasing concern of consumers and businesses.
2. Understand government has been given the role of regulator of some aspects of business activity including product safety.
3. Appreciate the partnership which exists between business and government regarding product safety.
4. Understand regulation provides both a cost and benefit to society.

### Materials

CHRONOLOGY OF PRODUCT LABELS activity sheet for each student
(one activity sheet per product reviewed)

Product labels past and present for:
Tide
Lilt
Cascade
Spic and Span

### Teaching strategies

Production techniques, resources used in production and overall concern for safe products (for humans, animals and for the environment) have changed over the years. People are more interested in choosing the best product for the money and in knowing more about the product and how to use it properly. This change can be discovered and reinforced by reviewing the labels of products over time and seeing how they "mirror" societal concerns. (A related activity, "What the Label Must Tell You," is included in the Home Economics section of this unit.)

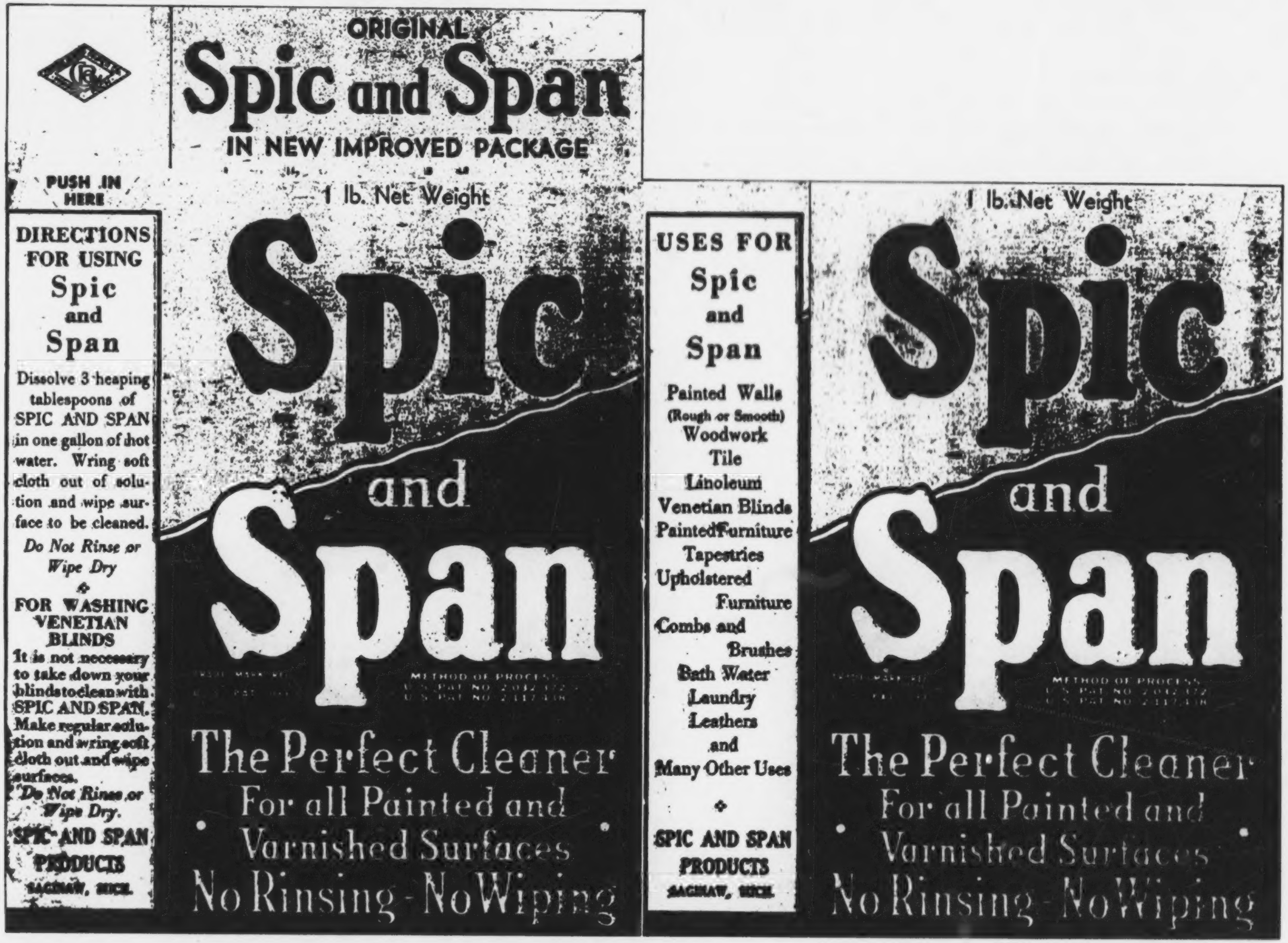
1. Ask, Why do products have labels? What would happen if products did not have labels? Suggest that labels have not always been as important as they are today. Distribute the student worksheet, "CHRONOLOGY OF PRODUCT LABELS" and label copies to each student for each product to be reviewed. Inform the students that they will be able to review labels for selected products. Their task is to complete the activity sheet for each product shown to them.

2. Discuss the activity sheets by comparing the students' answers. The students should conclude that products have become more complex over time. More or different ingredients are used for the purpose of making the products of higher quality, less expensive to produce, more effective, safer, etc. In addition, people have become more concerned about safety, resulting in directions for use and disposal that are more complete and may be found in a more prominent place on the label. Some students may suggest that convenience has become more important to consumers as they see better and easier to use packages. Finally, students may discover that competition has increased as the businesses use their labels for advertisements as well as information.

3. Suggest to the students that some of the government agencies discussed earlier have established rules which businesses must follow in providing consumers with certain information about their products on the package or label. Other regulations involve what ingredients to use and in what levels of concentration, and how to package the product.

Divide the class into two groups. Each group is to develop arguments regarding the involvement of government in the development and marketing of a product. Choose one group to be for involvement and the other side against it. Allow the students the opportunity to discuss their respective positions, conduct additional research, interview people, etc.. Once the research is completed ask each group to select three members of their group as a debate team.

4. Debate the topic of government involvement in the product development and marketing process. Culminate the debate with a total class vote on which side supplied the most convincing arguments.
Students survey their homes to determine the types and number of foreign made products they have purchased as a family. By reporting their findings to the class and locating and marking the country on a world map, the concept of an international marketplace is introduced.



ORIGINAL

# Spic and Span

IN NEW IMPROVED PACKAGE

PUSH IN HERE

**DIRECTIONS FOR USING**

**Spic and Span**

Dissolve 3 heaping tablespoons of SPIC AND SPAN in one gallon of hot water. Wring soft cloth out of solution and wipe surface to be cleaned.

*Do Not Rinse or Wipe Dry*

◆

**FOR WASHING VENETIAN BLINDS**

It is not necessary to take down your blinds to clean with SPIC AND SPAN. Make regular solution and wring soft cloth out and wipe surfaces.

*Do Not Rinse or Wipe Dry.*

**SPIC AND SPAN PRODUCTS**
SAGINAW, MICH.

1 lb. Net Weight

# Spic and Span

TRADE MARK REG.
U.S. PAT. OFF.

METHOD OF PROCESS
U.S. PAT. NO. 2,042,172
U.S. PAT. NO. 2,117,408

The Perfect Cleaner
For all Painted and
Varnished Surfaces
No Rinsing - No Wiping

**USES FOR**

**Spic and Span**

- Painted Walls (Rough or Smooth)
- Woodwork
- Tile
- Linoleum
- Venetian Blinds
- Painted Furniture
- Tapestries
- Upholstered Furniture
- Combs and Brushes
- Bath Water
- Laundry
- Leathers
- and Many Other Uses

◆

**SPIC AND SPAN PRODUCTS**
SAGINAW, MICH.

1 lb. Net Weight

Spic and Span

TRADE MARK REG.
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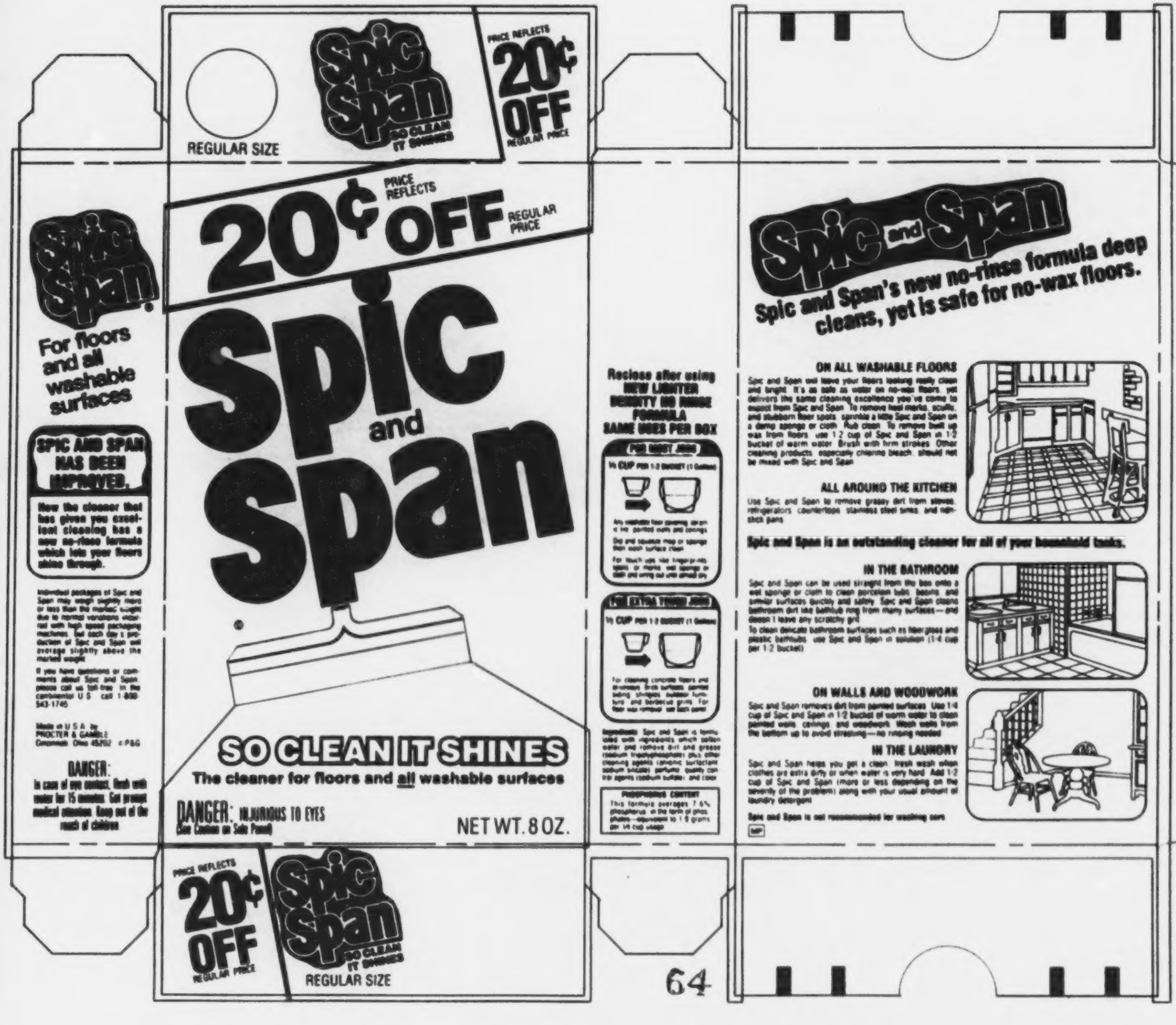


REGULAR SIZE

Spic Span
SO CLEAN IT SHINES

PRICE REFLECTS
20¢
OFF
REGULAR PRICE

20¢ OFF
PRICE REFLECTS
REGULAR PRICE

Spic and Span

SO CLEAN IT SHINES

The cleaner for floors and all washable surfaces

DANGER: INJURIOUS TO EYES
(See Caution on Side Panel)

NET WT. 8 OZ.

Spic Span®

For floors and all washable surfaces

**SPIC AND SPAN HAS BEEN IMPROVED.**

**Now the cleaner that has given you excellent cleaning has a new no-rinse formula which lets your floors shine through.**

Individual packages of Spic and Span may weigh slightly more or less than the marked weight due to normal variations inherent with high speed packaging machines, but each day's production of Spic and Span will average slightly above the marked weight.

If you have questions or comments about Spic and Span, please call us toll-free in the continental U.S. call 1-800-543-1745

Made in U.S.A. by
PROCTER & GAMBLE
Cincinnati, Ohio 45202 © P&G

**DANGER:**
**In case of eye contact, flush with water for 15 minutes. Get prompt medical attention. Keep out of the reach of children.**

Reclose after using
NEW LIGHTER
DENSITY NO RINSE
FORMULA
SAME USES PER BOX

**FOR MOST JOBS**

¼ CUP PER 1/2 BUCKET (1 Gallon)

Any washable floor covering, ceramic tile, painted walls and ceilings.

Dip and squeeze mop or sponge, then wash surface clean.

For touch ups like fingerprints, spots or marks, wet sponge in [illegible] and wring out until almost dry.

**FOR EXTRA TOUGH JOBS**

½ CUP PER 1/2 BUCKET (1 Gallon)

For cleaning concrete floors and driveways, brick surfaces, painted siding, shingles, outdoor furniture and barbecue grills. For floor wax removal see back panel.

**Ingredients:** Spic and Span is formulated with ingredients which soften water and remove dirt and grease (sodium tripolyphosphate) plus other cleaning agents (anionic surfactant, sodium silicate), perfume, quality control agents (sodium sulfate) and color.

**PHOSPHORUS CONTENT**
This formula averages 7.6% phosphorus in the form of phosphate—equivalent to 1.9 grams per 1/4 cup usage.

Spic and Span

Spic and Span's new no-rinse formula deep cleans, yet is safe for no-wax floors.

**ON ALL WASHABLE FLOORS**

Spic and Span will leave your floors looking really clean and bright. It's as safe as water on no-wax floors, yet delivers the same cleaning excellence you've come to expect from Spic and Span. To remove heel marks, scuffs, and stubborn floor spots, sprinkle a little Spic and Span on a damp sponge or cloth. Rub clean. To remove built up wax from floors, use 1/2 cup of Spic and Span in 1/2 bucket of warm water. Brush with firm strokes. Other cleaning products, especially chlorine bleach, should not be mixed with Spic and Span.

**ALL AROUND THE KITCHEN**

Use Spic and Span to remove greasy dirt from stoves, refrigerators, countertops, stainless steel sinks, and non-stick pans.

**Spic and Span is an outstanding cleaner for all of your household tasks.**

**IN THE BATHROOM**

Spic and Span can be used straight from the box onto a wet sponge or cloth to clean porcelain tubs, basins, and similar surfaces quickly and safely. Spic and Span cleans bathroom dirt like bathtub ring from many surfaces—and doesn't leave any scratchy grit.
To clean delicate bathroom surfaces such as fiberglass and plastic bathtubs, use Spic and Span in solution (1/4 cup per 1/2 bucket).

**ON WALLS AND WOODWORK**

Spic and Span removes dirt from painted surfaces. Use 1/4 cup of Spic and Span in 1/2 bucket of warm water to clean painted walls, ceilings, and woodwork. Wash walls from the bottom up to avoid streaking—no rinsing needed.

**IN THE LAUNDRY**

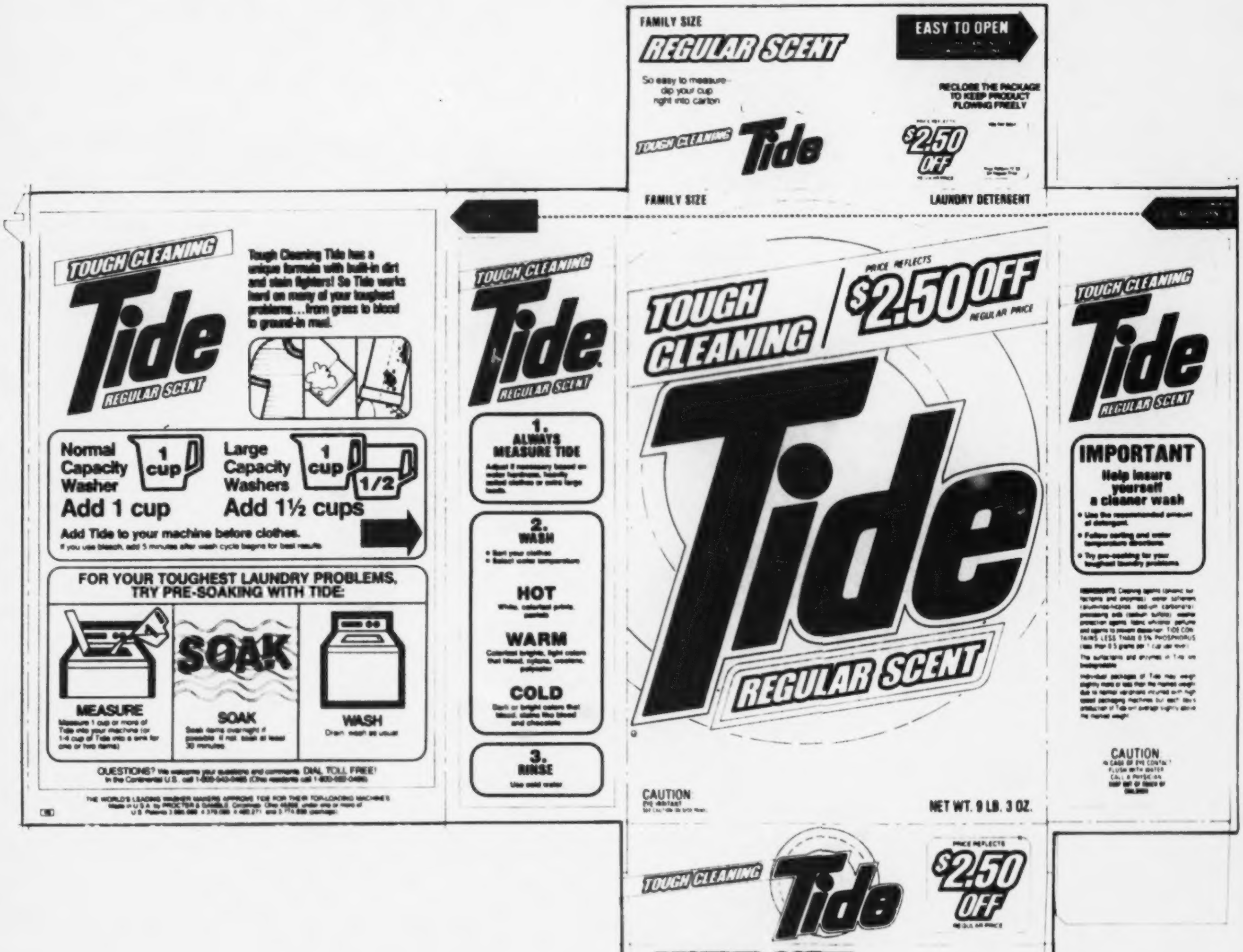
Spic and Span helps you get a clean, fresh wash when clothes are extra dirty or when water is very hard. Add 1/2 cup of Spic and Span (more or less depending on the severity of the problem) along with your usual amount of laundry detergent.

Spic and Span is not recommended for washing cars.

MP

PRICE REFLECTS
20¢
OFF
REGULAR PRICE

Spic Span
SO CLEAN IT SHINES
REGULAR SIZE



FAMILY SIZE

REGULAR SCENT

EASY TO OPEN

So easy to measure–
dip your cup
right into carton

RECLOSE THE PACKAGE
TO KEEP PRODUCT
FLOWING FREELY

TOUGH CLEANING Tide

$2.50 OFF

FAMILY SIZE

LAUNDRY DETERGENT

TOUGH CLEANING

Tide

REGULAR SCENT

Tough Cleaning Tide has a unique formula with built-in dirt and stain fighters! So Tide works hard on many of your toughest problems…from grass to blood to ground-in mud.

Normal Capacity Washer
1 cup
Add 1 cup

Large Capacity Washers
1 cup
1/2
Add 1½ cups

Add Tide to your machine before clothes.
If you use bleach, add 5 minutes after wash cycle begins for best results.

FOR YOUR TOUGHEST LAUNDRY PROBLEMS, TRY PRE-SOAKING WITH TIDE:

SOAK

**MEASURE**
Measure 1 cup or more of Tide into your machine (or 1/4 cup of Tide into a sink for one or two items)

**SOAK**
Soak items overnight if possible. If not, soak at least 30 minutes.

**WASH**
Drain, wash as usual

QUESTIONS? We welcome your questions and comments. DIAL TOLL FREE!
In the Continental U.S. call 1-800-[illegible] (Ohio residents call 1-800-[illegible])

THE WORLD'S LEADING WASHER MAKERS APPROVE TIDE FOR THEIR TOP-LOADING MACHINES.
Made in U.S.A. by PROCTER & GAMBLE, Cincinnati, Ohio [illegible] under one or more of
U.S. Patents [illegible] (package)

TOUGH CLEANING

Tide

REGULAR SCENT

**1.**
**ALWAYS MEASURE TIDE**
Adjust if necessary based on water hardness, heavily soiled clothes or extra large loads.

**2.**
**WASH**
- Sort your clothes
- Select water temperature

**HOT**
White, colorfast prints, pastels

**WARM**
Colorfast brights, light colors that bleed, nylons, woolens, polyester

**COLD**
Dark or bright colors that bleed, stains like blood and chocolate

**3.**
**RINSE**
Use cold water

TOUGH CLEANING

PRICE REFLECTS
$2.50 OFF
REGULAR PRICE

Tide

REGULAR SCENT

CAUTION
EYE IRRITANT
See caution on side panel

NET WT. 9 LB. 3 OZ.

TOUGH CLEANING

Tide

REGULAR SCENT

**IMPORTANT**
**Help insure yourself a cleaner wash**
- Use the recommended amount of detergent.
- Follow sorting and water temperature directions.
- Try pre-soaking for your toughest laundry problems.

INGREDIENTS: Cleaning agents (anionic surfactants and enzymes); water softeners (aluminosilicates, sodium carbonate); processing aids (sodium sulfate); washer protection agents; fabric whitener; perfume and agents to prevent discolor. TIDE CONTAINS LESS THAN 0.5% PHOSPHORUS (less than 0.5 grams per 1 cup use level).

The surfactants and enzymes in Tide are biodegradable.

Individual packages of Tide may weigh slightly more or less than the marked weight due to normal variations incurred with high speed packaging machines, but each day's production of Tide will average slightly above the marked weight.

CAUTION
IN CASE OF EYE CONTACT
FLUSH WITH WATER
CALL A PHYSICIAN
KEEP OUT OF REACH OF
CHILDREN

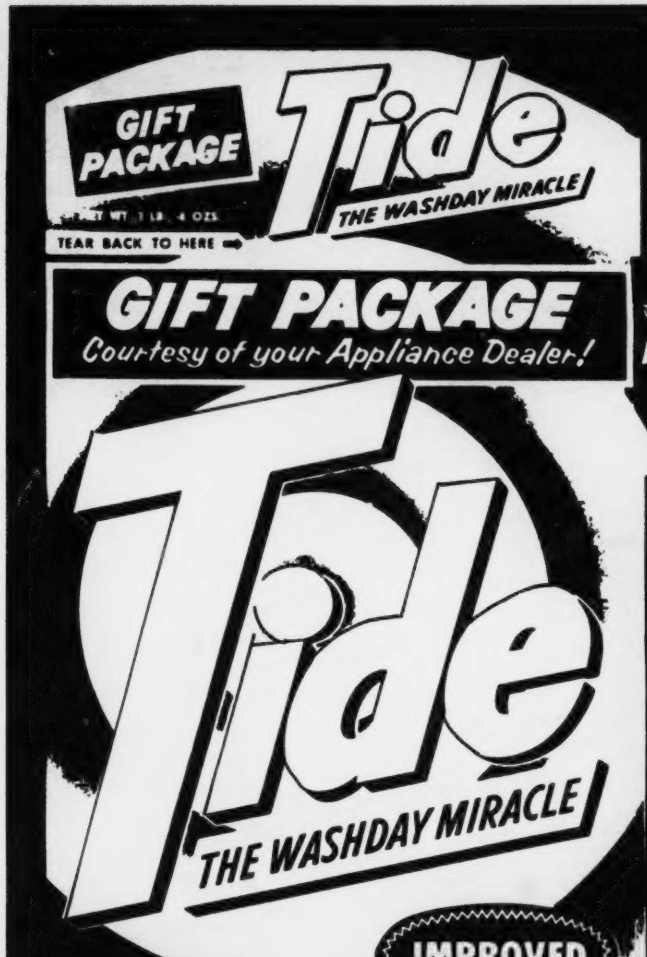
TOUGH CLEANING

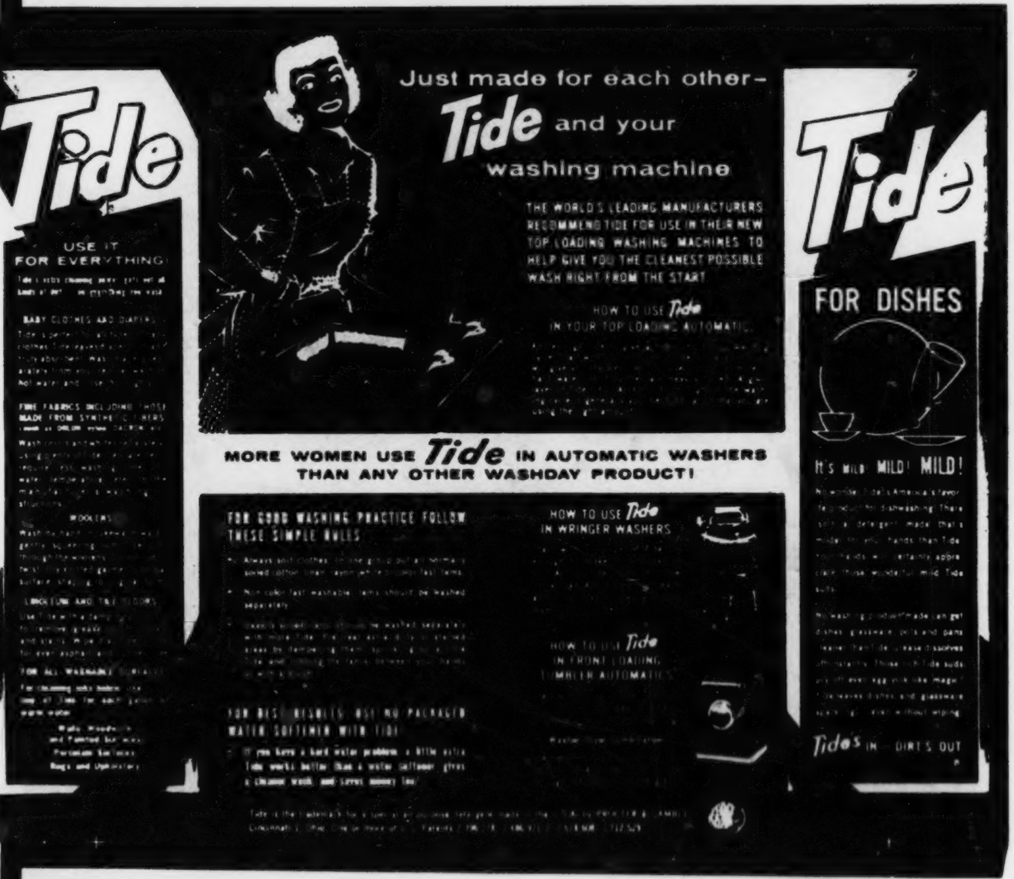
Tide

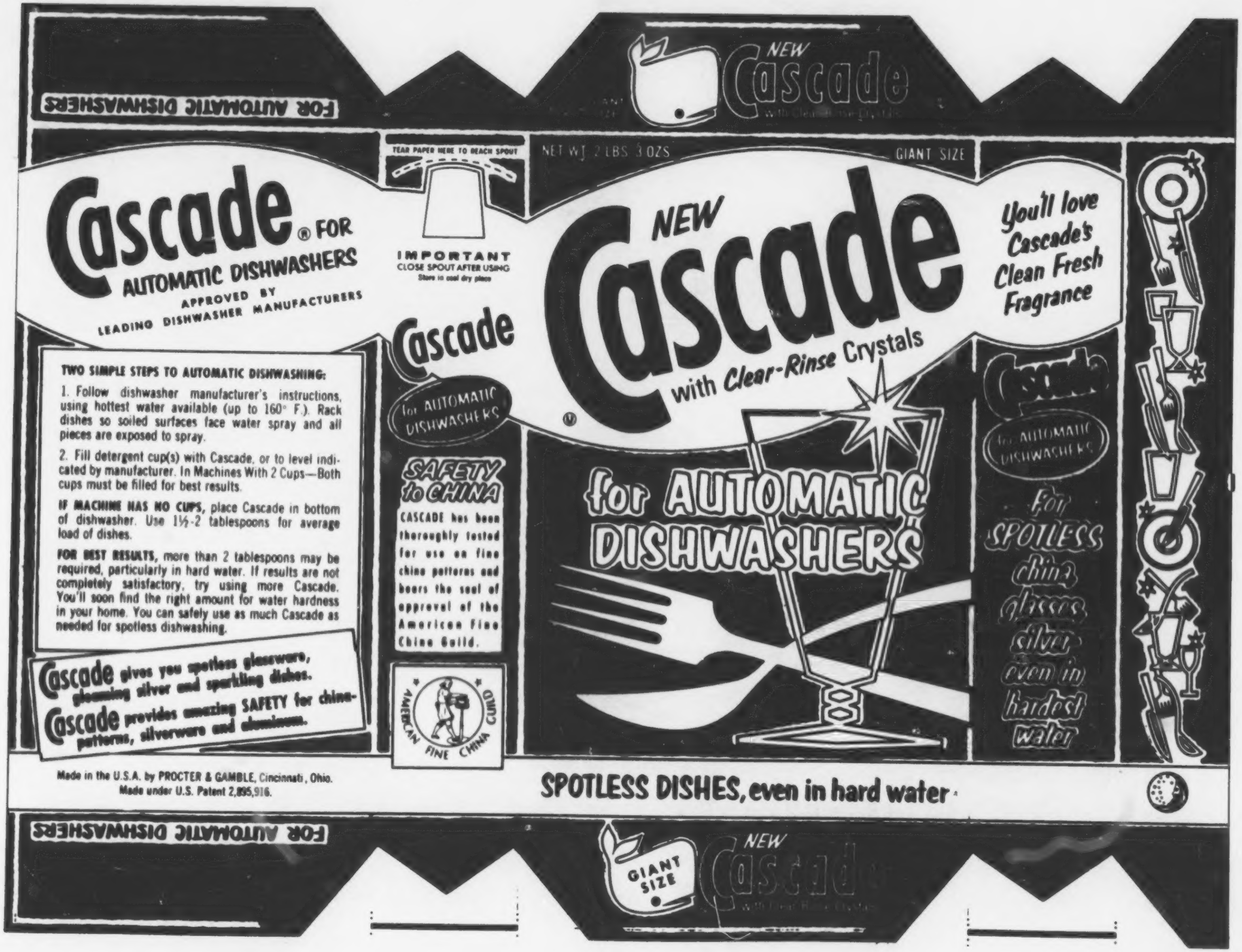
PRICE REFLECTS
$2.50 OFF
REGULAR PRICE

REGULAR SCENT

FAMILY SIZE


GIFT PACKAGE
Tide
THE WASHDAY MIRACLE
NET WT. 1 LB. 4 OZS.
TEAR BACK TO HERE
GIFT PACKAGE
Courtesy of your Appliance Dealer!
Tide
THE WASHDAY MIRACLE
IMPROVED
laundry . . . dishes
Tide
THE WASHDAY MIRACLE


Tide
USE IT FOR EVERYTHING
BABY CLOTHES AND DIAPERS
FINE FABRICS INCLUDING THOSE MADE FROM SYNTHETIC FIBERS
WOOLENS
LINOLEUM AND TILE FLOORS
FOR ALL WASHABLE SURFACES
Walls, Woodwork and Painted Surfaces
Porcelain Surfaces
Rugs and Upholstery
Just made for each other–
Tide and your washing machine
THE WORLD'S LEADING MANUFACTURERS RECOMMEND TIDE FOR USE IN THEIR NEW TOP LOADING WASHING MACHINES TO HELP GIVE YOU THE CLEANEST POSSIBLE WASH RIGHT FROM THE START
HOW TO USE Tide IN YOUR TOP LOADING AUTOMATIC
MORE WOMEN USE Tide IN AUTOMATIC WASHERS THAN ANY OTHER WASHDAY PRODUCT!
FOR GOOD WASHING PRACTICE FOLLOW THESE SIMPLE RULES
Non color fast washable items should be washed separately.
FOR BEST RESULTS USE NO PACKAGED WATER SOFTENER WITH TIDE
If you have a hard water problem, a little extra Tide works better than a water softener, gives a cleaner wash, and saves money too!
HOW TO USE Tide IN WRINGER WASHERS
HOW TO USE Tide IN FRONT LOADING TUMBLER AUTOMATICS
Tide
FOR DISHES
It's MILD! MILD! MILD!
Tide's IN ... DIRT'S OUT


FOR AUTOMATIC DISHWASHERS
NEW
Cascade
with Clear-Rinse Crystals
Cascade® FOR
AUTOMATIC DISHWASHERS
APPROVED BY
LEADING DISHWASHER MANUFACTURERS
TEAR PAPER HERE TO REACH SPOUT
IMPORTANT
CLOSE SPOUT AFTER USING
Store in cool dry place
Cascade
for AUTOMATIC DISHWASHERS
SAFETY to CHINA
AMERICAN FINE CHINA GUILD
NET WT. 2 LBS. 3 OZS
GIANT SIZE
NEW
Cascade®
with Clear-Rinse Crystals
for AUTOMATIC DISHWASHERS
You'll love Cascade's Clean Fresh Fragrance
Cascade
for AUTOMATIC DISHWASHERS
For SPOTLESS china glasses silver even in hardest water
SPOTLESS DISHES, even in hard water
FOR AUTOMATIC DISHWASHERS
GIANT SIZE
NEW
Cascade
with Clear-Rinse Crystals

**TWO SIMPLE STEPS TO AUTOMATIC DISHWASHING:**

1. Follow dishwasher manufacturer's instructions, using hottest water available (up to 160° F.). Rack dishes so soiled surfaces face water spray and all pieces are exposed to spray.

2. Fill detergent cup(s) with Cascade, or to level indicated by manufacturer. In Machines With 2 Cups—Both cups must be filled for best results.

**IF MACHINE HAS NO CUPS,** place Cascade in bottom of dishwasher. Use 1½-2 tablespoons for average load of dishes.

**FOR BEST RESULTS,** more than 2 tablespoons may be required, particularly in hard water. If results are not completely satisfactory, try using more Cascade. You'll soon find the right amount for water hardness in your home. You can safely use as much Cascade as needed for spotless dishwashing.

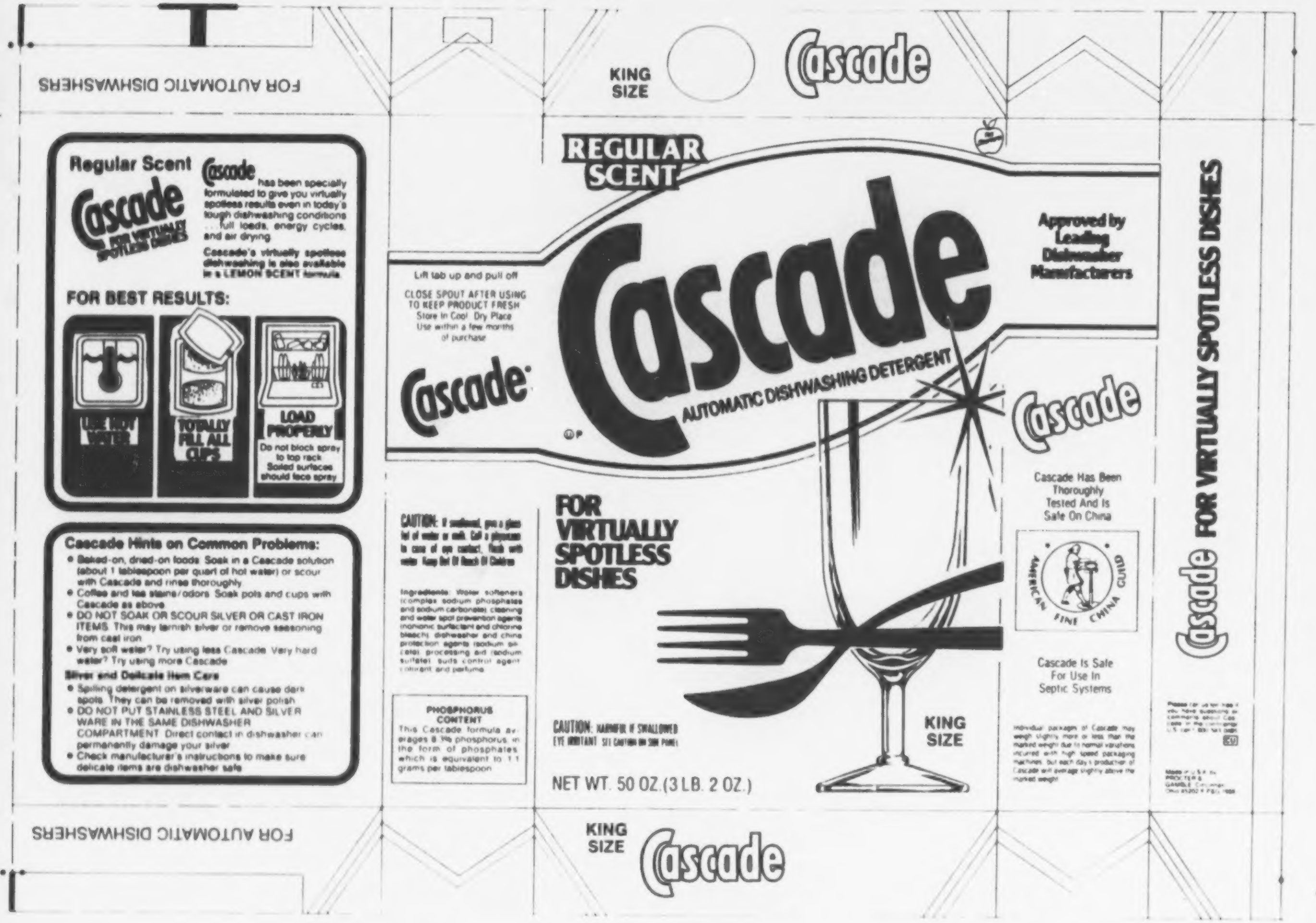
Cascade gives you spotless glassware, gleaming silver and sparkling dishes.

Cascade provides amazing SAFETY for china-patterns, silverware and aluminum.

CASCADE has been thoroughly tested for use on fine china patterns and bears the seal of approval of the American Fine China Guild.

Made in the U.S.A. by PROCTER & GAMBLE, Cincinnati, Ohio.
Made under U.S. Patent 2,895,916.

]



FOR AUTOMATIC DISHWASHERS

KING SIZE

Cascade

REGULAR SCENT

Cascade

AUTOMATIC DISHWASHING DETERGENT

Approved by Leading Dishwasher Manufacturers

Regular Scent

Cascade FOR VIRTUALLY SPOTLESS DISHES

Cascade has been specially formulated to give you virtually spotless results even in today's tough dishwashing conditions . . . full loads, energy cycles, and air drying.

Cascade's virtually spotless dishwashing is also available in a LEMON SCENT formula.

**FOR BEST RESULTS:**

USE HOT WATER

TOTALLY FILL ALL CUPS

LOAD PROPERLY

Do not block spray to top rack. Soiled surfaces should face spray.

**Cascade Hints on Common Problems:**

- Baked-on, dried-on foods: Soak in a Cascade solution (about 1 tablespoon per quart of hot water) or scour with Cascade and rinse thoroughly.
- Coffee and tea stains/odors: Soak pots and cups with Cascade as above.
- DO NOT SOAK OR SCOUR SILVER OR CAST IRON ITEMS. This may tarnish silver or remove seasoning from cast iron.
- Very soft water? Try using less Cascade. Very hard water? Try using more Cascade.

**Silver and Delicate Item Care**

- Spilling detergent on silverware can cause dark spots. They can be removed with silver polish.
- DO NOT PUT STAINLESS STEEL AND SILVER WARE IN THE SAME DISHWASHER COMPARTMENT. Direct contact in dishwasher can permanently damage your silver.
- Check manufacturer's instructions to make sure delicate items are dishwasher safe.

FOR AUTOMATIC DISHWASHERS

Lift tab up and pull off

CLOSE SPOUT AFTER USING TO KEEP PRODUCT FRESH
Store In Cool Dry Place
Use within a few months of purchase

Cascade®

**CAUTION:** If swallowed, give a glassful of water or milk. Call a physician. In case of eye contact, flush with water. Keep Out Of Reach Of Children.

Ingredients: Water softeners (complex sodium phosphates and sodium carbonate), cleaning and water spot prevention agents (nonionic surfactant and chlorine bleach), dishwasher and china protection agents (sodium silicate), processing aid (sodium sulfate), suds control agent, colorant and perfume.

PHOSPHORUS CONTENT
This Cascade formula averages 8.7% phosphorus in the form of phosphates which is equivalent to 1.1 grams per tablespoon.

FOR VIRTUALLY SPOTLESS DISHES

CAUTION: HARMFUL IF SWALLOWED
EYE IRRITANT. SEE CAUTION ON SIDE PANEL

NET WT. 50 OZ. (3 LB. 2 OZ.)

KING SIZE

Cascade

Cascade Has Been Thoroughly Tested And Is Safe On China

AMERICAN FINE CHINA GUILD

Cascade Is Safe For Use In Septic Systems

Individual packages of Cascade may weigh slightly more or less than the marked weight due to normal variations incurred with high speed packaging machines, but each day's production of Cascade will average slightly above the marked weight.

Cascade FOR VIRTUALLY SPOTLESS DISHES

Please call us toll free if you have questions or comments about Cascade. In the continental U.S. call 1-800-[illegible]

Made in U.S.A. by PROCTER & GAMBLE, Cincinnati, Ohio 45202 © P&G [illegible]

KING SIZE Cascade

FOR AUTOMATIC DISHWASHERS

1987

**SAVE 50¢**
on next Lilt purchase
*with coupon printed inside back panel*

Lilt®

**SELF-CONDITIONING**
**LOTION PERM**
*with Sponge End-Wraps*

---

Lilt

*Lotion Kit for*
*Normal Hair*

**IMPORTANT ADVICE BEFORE PERMING.**

- Do not perm if your hair has been bleached or highly lightened, frosted or permed within the past 3 months.
- Use 2 kits if your hair is longer than shoulder length.
- For children's hair, use a Lilt kit for Hard-to-Wave hair and check hair condition before perming.
- If you have any questions or comments about Lilt, please call us toll-free at 1-800-262-1637

---

*PRICE REFLECTS*
**$1.00 OFF**
*REGULAR PRICE*

**EASY!**
**SELF-CONDITIONING**

**LOTION PERM**
*with Sponge*
*End-Wraps*

Lilt

*Body, Waves or Curls*
**NORMAL HAIR**

*One LOTION Perm*

---

Lilt

*Lotion Kit for*
*Normal Hair*

This kit contains
- waving lotion
- neutralizer
- sponge end-wraps
- plastic cap and instructions

**Waving Lotion Ingredients**
Water, Ethanolamine Thioglycolate, Laureth-23, Ethanolamine, Mineral Oil, Fragrance, Polyquaternium-16, Potassium Oleate, Glycol, Oleic Acid, D&C Red No. 27

**Neutralizer Ingredients**
Water, Hydrogen Peroxide, Laureth-23, Fragrance, Quaternium-18

Made in U.S.A., Distributed by
PROCTER & GAMBLE
Cincinnati, Ohio 45202
©1985 P&G

---

## *Lilt Makes Perming Easy!*

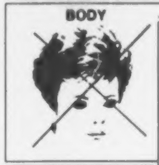
**Easy Conditioning**—Has built-in conditioners to give you a conditioned perm with the curl you expect without extra steps.

**Easy To Use Sponge End-Wraps**—Grips hair better than paper end-wraps for a better roll-up that helps protect hair's ends, and that means less frizzies!

**Easy Instructions**—Provides a step-by-step illustrated guide for easy perming.

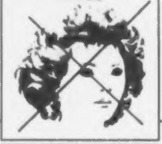
Use at least 30 large, thick rods for

**BODY**



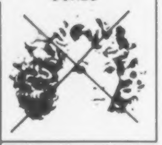
Use at least 40 medium size rods for

**WAVES**



Use at least 50 small, thin rods for

**CURLS**



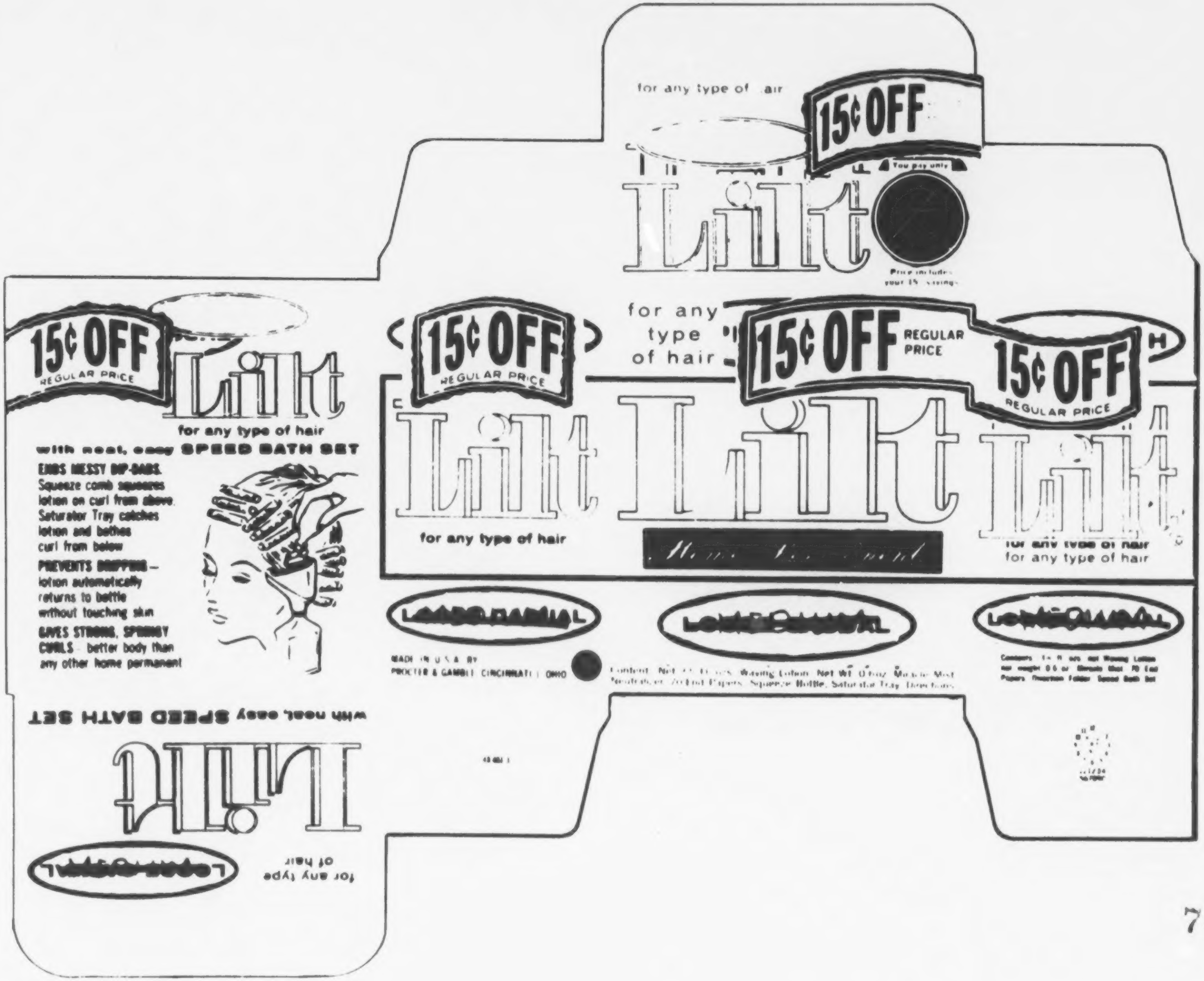
| Lilt Kit | Hair Type |
|---|---|
| Lilt Thin/Color-Treated Hair Lotion Kit | For hair that takes and holds a perm or set very well; also for thin or color-treated hair. |
| Lilt Normal Hair Lotion Kit | For normal hair. |
| Lilt Thick/Hard To Wave Hair Lotion Kit | For hair that does not take and hold a perm or set well; also for thick or coarse hair. |

Lilt kits also come in two convenient foam strengths: For Thin/Color-Treated Hair and For Normal or Thick/Hard to Wave Hair.

IMPORTANT: Follow all enclosed instructions carefully during perming. See left side panel of carton for additional advice before perming.

Lilt

1964


for any type of hair
15¢ OFF
You pay only
Lilt
Price includes your 15¢ savings
for any type of hair
15¢ OFF REGULAR PRICE
Lilt
for any type of hair
15¢ OFF REGULAR PRICE
Lilt
Home Permanent
15¢ OFF REGULAR PRICE
Lilt
for any type of hair
Lilt
for any type of hair
with neat, easy SPEED BATH SET
with neat, easy SPEED BATH SET
Lilt
for any type of hair

ENDS MESSY DIP-DABS. Squeeze comb squeezes lotion on curl from above. Saturator Tray catches lotion and bathes curl from below

PREVENTS DRIPPING — lotion automatically returns to bottle without touching skin

GIVES STRONG, SPRINGY CURLS — better body than any other home permanent

MADE IN U.S.A. BY
PROCTER & GAMBLE CINCINNATI, OHIO

Content: Net [illegible] Waving Lotion. Net Wt. [illegible] Neutralizer, 70 End Papers, Squeeze Bottle, Saturator Tray, Directions

Contents: [illegible] Waving Lotion [illegible] End Papers [illegible] Folder Speed Bath Set

73

74

STUDENT
ACTIVITY

# Chronology of Product Labels:

## Reading Labels for Information

**Purpose**

To discover the changing attitudes of consumers relating to safety, the environment, convenience and choice.

**Directions**

Carefully review the labels presented. Develop and write conclusions about the changing opinions of consumers and businesses in the spaces provided.

Product being reviewed__________________________

**1. DESCRIBE HOW THE LABELS HAVE CHANGED OVER TIME BOTH IN APPEARANCE AND CONTENT.**

**2. WHAT DO YOU THINK CONSUMERS VALUED IN THE PAST AND CURRENTLY IN RELATIONSHIP TO THIS PRODUCT?**

**3. DO THE LABELS SUGGEST THAT PEOPLE CHANGED THEIR ATTITUDES ABOUT PRODUCT SAFETY? HOW?**

**4. DO THE LABELS SUGGEST THAT PEOPLE CHANGED THEIR ATTITUDES ABOUT THE ENVIRONMENT? HOW?**

**5. DO YOU THINK THE PRODUCT IS BETTER TODAY THAN IN THE PAST? EXPLAIN.**

# Chronology of Product Labels:

## Suggested answers to questions in the student activity

1. **DESCRIBE HOW THE LABELS HAVE CHANGED OVER TIME BOTH IN APPEARANCE AND CONTENT.**

   *Directions are more complete in the newer labels. Pictures are included in directions. More warnings and cautions are included. Labels now have ingredient statements and and an 800 number to call. Appearance is more up-to-date.*

2. **WHAT DO YOU THINK CONSUMERS VALUED IN THE PAST AND CURRENTLY IN RELATIONSHIP TO THIS PRODUCT?**

   *Answers will vary according to product. Students may conclude safety in use is more important today. Inclusion of phosphorus information may indicate environmental concerns.*

3. **DO THE LABELS SUGGEST THAT PEOPLE CHANGED THEIR ATTITUDES ABOUT PRODUCT SAFETY? HOW?**

   *Yes. Current labels include more warnings and cautions for safe use and storage.*

4. **DO THE LABELS SUGGEST THAT PEOPLE CHANGED THEIR ATTITUDES ABOUT THE ENVIRONMENT? HOW?**

   *Current labels include information about phosphorus content. Some labels contain statements concerning safety for septic systems. Directions for use in cold water are included on the Tide label.*

5. **DO YOU THINK THE PRODUCT IS BETTER TODAY THAN IN THE PAST? EXPLAIN.**

   *Answers will vary.*

# Products Around the World

## Surveying the World Marketplace

## Overview

The international marketplace suggests that American made products are purchased by consumers in foreign countries just as we buy foreign made products. In order to sell products abroad successfully, businesses must satisfy foreign consumers' needs and wants just as they do domestically. Culture and environment influences what people value; consequently, what sells in one country may need to be modified to sell in another.

## Time required

Two class periods

## Concepts covered in this lesson

Culture
Risks
Costs and Benefits
Product Safety
Decision making

## Objectives

Students who complete this unit should be able to:

1. Understand product safety decisions often reflect the values and culture of the society in which they are made.

## Materials

One large world map
AN EXECUTIVE SPEAKS ABOUT THE WORLD MARKETPLACE reading for each student.

## Teaching strategies

The level of imports and exports to and from the United States grows daily. Foreign producers perceive the United States to be a large market for their products. Similarly, American business decision makers are viewing foreign markets as good opportunities to expand sales. Both foreign and domestic producers must meet the needs and desires of consumers to be successful.

1. Direct the students to do a household search for products their families have purchased which were made in another country. Have them make a list and bring labels from the products whenever possible. (Caution them not to tear off labels without permission.) Remind students to look in their pantries, closets, garages and other places for foreign made products. Typical products found in the home search include tennis shoes, clothing, canned goods, electronic equipment, cars, sporting goods, gloves, appliances, etc.

2. Ask the students to report their findings by describing to the class the foreign made products they found in their homes. When labels are available, ask the students to place them on a large world map on the bulletin board close by the countries where the products were made. This will demonstrate the magnitude of purchases we make from foreign producers as well as what countries are our primary suppliers. Discuss the implications of these findings for the following groups:

**American consumers**
(e.g., lower prices, more choices)

**Foreign consumers**
(e.g., lower prices, more choices)

**The economy**
(e.g., lower prices, efficiency, better products)

**American producers**
(e.g., the benefits of free trade, more exports, competition, need to improve quality and efficiency to compete

**Foreign producers**
(e.g., new markets, competition)

Students should see how foreign producers place competitive pressure on domestic producers to make products consumers like. In addition, foreign trade allows the countries involved to have a larger number of goods and services to choose from.

3. Assign the students the task of selecting one of the following activities for a homework assignment:

A. Interview a person who has visited a foreign country. Find out what life is like and what products made in the United States were seen being used.

B. Interview a person who has lived in a foreign country. Find out what life is like and what products foreign and domestic they used.

C. Research the level of imports and exports of the United States over time. Identify our key trading partners and the types of goods and services traded. The World Almanac is an excellent source for this activity.

D. Interview a business person whose company sells its product abroad.

E. Find a newspaper or magazine article which demonstrates the type and level of trade transacted by the United States.

4. Distribute the student reading, AN EXECUTIVE SPEAKS ABOUT THE WORLD MARKETPLACE. Ask the students to read the speech and determine why German consumers slowed their buying of Lenor, a product they liked. The issue of solid waste disposal was the primary reason because the German people live in a densely populated area and the cost of waste disposal is high. Ask, Why did Procter & Gamble respond the way it did to Lenor's packaging problem? Is it unique for a business to decide to satisfy the wishes of consumers? The students should see the similarity between businesses' attempt to please the consumer at home as well as abroad. Although differences in culture may be reflected by differing needs and desires on the part of the consumer, the need for businesses to identify these needs and fulfill them is the same.

5. Have the students report their findings to the class.

STUDENT
BACKGROUND
READING

# An Executive Speaks

## About the World Marketplace

*The following speech, based on fact and edited for this lesson, was delivered by one of Procter & Gamble's executives to a meeting of the company's managers.*

It is my pleasure to meet with you today and to be back in the United States. As you know, I have spent the past few months in West Germany attempting to solve a unique problem with one of our products.

Lenor Fabric Softener sales were strong for many years. The German people felt the product was superior to others on the market. However, in the past few months sales dropped.

As business people, we had to ask, Why would consumers stop buying a product they really liked?

Our research supplied us with some interesting and useful facts. Germany is densely populated and environmental concerns, therefore, have a high impact. The Green Party, a political party concerned about the environment, moved into parliament in the early 80's. There is emotional power behind the word Umwelt. Umwelt means environment, or the world around us. This was the concern of the Green Party.

In other words, the German people became concerned about the quality of their Umwelt. No one wants to breathe bad air, swim in dirty water or drown in garbage. The concern over pollution translated into higher costs of disposing of solid wastes.

Consequently, the German people became concerned about the volume of garbage their families were generating. After all, it cost them money to dispose of every bulky item of trash. One bulky item which became visible was the Lenor fabric softener container. Because the German people did not want to pollute their environment and pay for the high cost of garbage disposal, the demand for Lenor Fabric Softener fell. Once Lenor captured 40% of the market, but fell to about 10%. A solution had to be found.

We needed an invention and so we invented the refill pouch. The new idea is to sell a concentrate of Lenor as a refill pack. You ask the consumer to pour it into their empty four liter bottle and add water to fill the container. Although this is an inconvenience to the consumer, the environmental and cost benefits gained outweighed the inconvenience cost.

The German people reacted enthusiastically. The sales are increasing. We listened to the consumer's wants. Let's hear it for Yankee ingenuity!

This response to problems in the marketplace is the type of commitment Procter & Gamble has to the 45 foreign countries currently receiving the benefits of our products.

# Social Studies Glossary

| | |
|---|---|
| **Costs and Benefits** | A process of decision making in which people select the alternative or alternatives that maximize their satisfaction and/or minimize their unhappiness. |
| **Culture** | The characteristic features of a certain civilization. |
| **Decision making** | The process of reaching a conclusion after consideration, and acting upon that conclusion. |
| **Government** | The established form of political administration. |
| **Laws** | The accepted rules of society which direct social and economic behavior. |
| **Product safety** | The degree to which a product will not harm people, animals and the environment now and in the future. |
| **Regulatory agencies** | Government department or groups given the power and responsibility to monitor activities for the protection of the general welfare. |
| **Risks** | The chance of loss resulting from a particular event or decision. |

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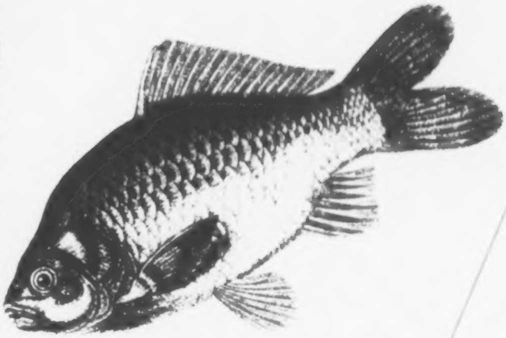

# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR HOME ECONOMICS EDUCATORS

PROCTER & GAMBLE
EDUCATIONAL SERVICES

# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR HOME ECONOMICS EDUCATORS

PROCTER & GAMBLE
EDUCATIONAL SERVICES

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We hope you find DECISIONS ABOUT PRODUCT SAFETY a useful and helpful addition to your classes.

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# Decisions About Product Safety

## Overview

Confronted by an ever-increasing array of products in the market, consumers face complex decisions. . . What should I buy? Is the product safe for my family? For the environment? How should I use it? What is the potential for misuse, especially if there are young children in the home? (According to the Consumer Product Safety Commission, over 90% of people sent to emergency rooms with injuries resulting from use of toxic household products are children under four years old.) How should I dispose of the product? Should I be concerned about the problem of solid waste disposal?

Businesses must consider the question, "How safe is safe?" Safety, both for humans and the environment, is a vital concern to product manufacturers. Procter & Gamble, for example, employs more than 500 people for work directly related to product safety and many more people indirectly.

Product safety education should be a critical component in home economics classes. This section will explore companies' decisions related to product safety and consumers' responsibility for safe use, storage and disposal of household chemicals.

The Home Economics section is designed to be completed in five class periods with three activities:

**Activity 1 : What's In A Label?** Students conduct a survey to determine the number and types of household chemical products in their homes. Readings include classifications of hazardous chemicals and labeling laws. The role of business in providing clear reliable directions is examined in a comparison of label changes of three Procter & Gamble consumer products.

**Activity 2 : If Only I . . . The Case for Safe Product Use.** Students make decisions regarding safe use, storage and disposal of household products. They examine the concern of businesses for foreseeable consumer misuse. Special attention is given to prevention and treatment of children's accidental poisoning.

**Activity 3 : Consumers and Business: Partners in Product Safety.** Students examine product safety from a consumer and business perspective. Issues discussed include solid waste disposal, product packaging and safety testing.

# Activity 1: What's In A Label?

Students conduct a survey to determine the number and types of household chemical products in their homes. Readings include classifications of hazardous chemicals and labeling laws. The role of business in providing clear, reliable directions is examined in a comparison of label changes of three Procter & Gamble consumer products.

One to two class periods plus homework

Household chemicals
Labels and directions
Federal Hazardous Substance Act
Poison Prevention Packaging Act

Students who complete this unit should be able to:

1. Analyze information needed on product labels and directions to make decisions related to purchase of household chemical products.
2. Interpret label directions.
3. Identify information required by the Federal Hazardous Substance Act for labels.
4. Recognize classifications of hazardous materials.

1. Duplicate and assign Student Activity, SUPER SLEUTH in the beginning to allow time for students to complete.
2. Label five jars filled with water according to directions in the strategy.
3. Duplicate for students: HOUSEHOLD CHEMICALS, WHAT THE LABEL MUST TELL YOU, COMPARISON OF PRODUCT LABEL DEVELOPMENT and SUPER SLEUTH SUMMARY SHEET.
4. Collect or instruct students to bring a variety of household chemical product containers and labels. As a safety precaution, display labels only for toxic products.

1. To introduce the unit, distribute five jars filled with water to student groups. Label jars: dishwasher detergent, multipurpose household cleanser, cold medicine, drain cleaner and insecticide. Ask each group to develop a set of directions for use for the product. Students may want to create graphics for their directions. Distribute an actual product (or label in the case of toxic products) for each of these categories to the appropriate group. Ask each group to compare its response with the actual product directions and share its analysis with the class.

2. Duplicate and distribute Student Reading, HOUSEHOLD CHEMICALS. This reading defines chemicals and classifies hazardous chemicals which may be found in household products. (Teacher's note: This reading and questions could be assigned as homework.) Clarify the terminology and definitions through class discussion of the questions. (More information on this subject can be found in the "Toxicity" activity in the Science section of this unit.)

3. Duplicate and distribute Student Reading, WHAT THE LABEL MUST TELL YOU. This reading identifies the information required by the Federal Hazardous Substance Act to appear on a label. (Teacher's note: This reading could be assigned as homework.) Clarify the terminology and definitions through class discussion.

4. Collect a variety of household chemical products in each of the following categories (preferably using empty containers or labels for toxic products) medicines, laundry detergents, household cleansers, grooming products, paint products and insecticides.

   a. Analyze the labels for clarity of directions and adequacy of safety information. Compare the label against the information required in Student Reading, WHAT THE LABEL MUST TELL YOU.

   b. Inform the students that they should contact the product manufacturer identified on the label if the information is unclear.

5. Duplicate and distribute Student Activity, COMPARISON OF PRODUCT LABEL DEVELOPMENT. Show students copies of each label — Comet, Spic and Span and Lilt. Allow students adequate time to write responses. Students may work in small groups to develop responses to the analysis questions at the end. Share the responses in class discussion.

6. Duplicate and distribute Student Activity, SUPER SLEUTH and SUPER SLEUTH SUMMARY SHEET. (Teacher's note: You might want to give this activity to students before you begin the unit to allow time for them to complete the worksheet.)

   a. As a class, compile the numbers from the summary sheet. Compute an average for each household for each statistic.

   b. Ask each student to write a paragraph which draws conclusions about the number and types of household chemicals in his or her home. How many of these products were available 20 years ago? 10 years ago? 5 years ago?

   c. As an extended project, invite interested students to write an article for the school paper, local community paper or parents' newsletter about the findings.

# Household Chemicals

What do you picture when you hear the term chemical? Do you think of an overturned truck spilling chemicals? Vitamin C in orange juice? Factories dumping toxic wastes? Lifesaving medicines?

Let's define some terms:

**Chemical** - All matter is composed of chemical elements. Chemicals may be pure substances such as iron or oxygen. Most chemicals are compounds or combinations of elements. For example, water is composed of hydrogen and oxygen and sugar is composed of three elements — carbon, hydrogen and oxygen.

We are surrounded by chemicals. Our food, water, clothing and even our bodies are all composed of chemicals. Some chemicals are natural, meaning they are found in nature. Man-made or synthetic chemicals are new combinations of elements not found in nature.

When we are tempted to think of the good old days when life was "simple," we may forget the drudgery involved in household work. Chemicals have improved the quality of our lives. We eat better, enjoy high tech products, and live longer as a result of advances in chemistry.

**Hazardous chemical** - A hazardous chemical is a substance that may cause substantial illness or injury to people or the environment. The average home contains between three and ten gallons of materials that are classified as hazardous.

Classifications of hazardous materials include:

**Corrosive** chemicals are capable of dissolving or wearing away gradually, especially by chemical action. Most corrosive materials are potentially dangerous to the skin, and may cause severe burns on contact. They can burn eyes as well. Examples include drain cleaners and oven cleaners.

**Flammable** chemicals pose a fire hazard during routine handling. Examples include kerosene, gasoline and matches.

**Reactive** chemicals tend to react spontaneously or vigorously with air or water, are unstable to shock or heat, generate toxic gases or explode. An example is the toxic gas which forms when chlorine bleach is mixed with lye or ammonia.

**Toxic** means poisonous. Toxic materials pose a substantial hazard to human health and may cause illness, injury or death. Toxic chemicals may be harmful if they are swallowed, if they are absorbed through the skin or if their fumes or vapors are inhaled. Examples of toxic chemicals include pesticides, many toilet bowl cleaners and antifreeze.

Household chemicals are those chemical products used around the home and include medicines, personal care products, detergents, household cleansers, paint products and pesticides.

The term "toxicity" refers to the degree to which a substance is poisonous. Most of us would agree that foods generally are not toxic. Oils, polishes and household bleaches are classified as moderately toxic. Most toilet bowl cleaners, paintbrush cleaners and deodorizers are very toxic. Pesticides, insecticides and mercury cell batteries are extremely toxic. A taste of some pesticides is lethal.

A poison is defined as a substance which has a lethal dose of 50 mg or less per kilogram of body weight. This is about 3/4 of a teaspoon for adults and about 1/8 teaspoon for a two-year-old child. Very few chemicals are lethal in such small quantities.

**EVERY CHEMICAL IN THE HOME HAS THE POTENTIAL OF HARMING HUMANS IF USED INCORRECTLY. IT IS OUR RESPONSIBILITY TO LEARN TO USE CHEMICALS WISELY SO THAT THEIR BENEFITS OUTWEIGH RISKS.**

## QUESTIONS

1. Describe corrosive chemicals. Give an example.

2. What type of chemical poses a fire hazard during routine handling?

3. What are reactive chemicals? Give an example.

4. Define poison.

5. The reading concludes with the statement that every chemical in the home has the potential of harming humans if used incorrectly. Explain this statement.

# Household Chemicals

## Suggested answers to questions in the student reading

1. **DESCRIBE CORROSIVE CHEMICALS. GIVE AN EXAMPLE.**

*Corrosive chemicals are capable of dissolving or wearing away gradually, especially by chemical action. Examples: drain cleaners, oven cleaners*

2. **WHAT TYPE OF CHEMICAL POSES A FIRE HAZARD DURING ROUTINE HANDLING? GIVE AN EXAMPLE.**

*Flammable chemicals pose a fire hazard during routine handling.*
*Examples: kerosene, gasoline, matches*

3. **WHAT ARE REACTIVE CHEMICALS? GIVE AN EXAMPLE.**

*Reactive chemicals tend to react spontaneously or vigorously with air or water, are unstable to shock or heat, generate toxic gases or explode. Examples: chlorine bleach mixed with lye or ammonia*

4. **DEFINE POISON.**

*A poison is a substance which has a lethal dose of 50mg or less per kilogram of body weight. This is about 3/4 of a teaspoon for adults and about 1/8 teaspoon for a two-year-old child.*

5. **THE READING CONCLUDES WITH THE STATEMENT THAT EVERY CHEMICAL IN THE HOME HAS THE POTENTIAL OF HARMING HUMANS IF USED INCORRECTLY. EXPLAIN THIS STATEMENT.**

*If directions are not followed, chemicals may be corrosive, flammable, reactive or toxic. In the case of toxic chemicals, the dosage is critical. Even substances usually considered to be safe are toxic if the dose is high. For example, a small amount of ordinary table salt is not harmful, but several teaspoons could be fatal to a small child.*

# What The Label Must Tell You

In the 1960s, the Federal Hazardous Substance Act was signed into law in an effort to protect consumers from hazardous consumer products. The Act, now administered by the Consumer Product Safety Commission, provides for the labeling of all products that are, or contain, a hazardous substance.

Information required on these labels include:

1. A signal word: **DANGER** on products which are extremely flammable, corrosive or highly toxic, and **WARNING** or **CAUTION** on all other hazardous substances required to bear a label.

2. The additional word **POISON** and the skull and crossbones symbol on highly toxic and other specifically named substances.

3. A description of the principal hazards involved in using the products such as **VAPOR HARMFUL, FLAMMABLE,** etc.

4. A statement of measures the user should take to avoid the hazard such as **USE ONLY IN A WELL-VENTILATED AREA.**

5. A list of the common names of the hazardous ingredients. If a hazardous substance has no common name, the chemical name will be used.

6. If necessary, instructions for **SAFE HANDLING** and **STORAGE**.

7. **FIRST AID** instructions.

8. Name and location of the **MANUFACTURER, DISTRIBUTOR** or **REPACKER**.

9. The statement **KEEP OUT OF THE REACH OF CHILDREN** or its equivalent.

10. Any additional information the Commission finds necessary to protect the public health.

In addition, the Poison Prevention Packaging Act (PPPA) provides the authority to establish child-resistant packaging standards to restrict children's access to certain products such as furniture polish, aspirin, turpentine and paint solvents. The PPPA is also administered by the Consumer Product Safety Commission.

STUDENT
ACTIVITY

# Comparison of Product Labels and Instructions

| **PRODUCT** | **LIST CHANGES IN DIRECTIONS AND SAFETY INSTRUCTIONS FROM EARLY TO CURRENT LABEL COPY OR INSTRUCTIONS** | |
|---|---|---|
| **Comet** | 1963 | 1986 |
| **Spic and Span** | 1945 | 1986 |
| **Lilt** | 1958 | 1988 |

**ANALYZE CHANGES IN TERMS OF PRODUCT SAFETY. FOR THE CURRENT SET OF LABELS:**

1. Are there more or fewer instructions related to product safety?

2. Are there more or fewer graphics or pictures?

3. Are the instructions simpler or more complex?

4. Is the print size smaller or larger?

5. Why do you think Procter & Gamble made these changes?

# Comparison of Product Development

## Suggested answers to questions in the student activity

| **PRODUCT** | **CHANGES IN DIRECTIONS AND SAFETY INFORMATION** |
|---|---|
| **Comet** | **In 1963:**<br>• no warnings or cautions for either humans or for surfaces other than silverware<br>• unqualified recommendations |
| | **In 1986:**<br>• silica removed so it's safe for more surfaces<br>• recommended by Elkay for stainless steel sinks<br>• simpler directions, clearer graphics<br>• warning—keep away from children; what to do if it gets into eyes<br>• do not mix with ammonia or bleach<br>• do not use on silver, painted surfaces, walls, soft plastic or rubber<br>• 800 number for questions or comments<br>• UPC symbol |
| **Spic and Span** | **In 1945:**<br>• safe for all washable surfaces<br>• wonderfully mild to hands—"milder to hands than any detergent"<br>• safe for paint<br>• fairly thorough usage instructions |
| | **In 1986:**<br>• phosphorous content identified<br>• not recommended for cars or unpainted aluminum<br>• eye irritation—keep out of reach of children<br>• weight variation statement<br>• 800 number for questions or comments<br>• larger print, clear graphics<br>• simpler directions |
| **Lilt** | **In 1958:**<br>• advice before waving about scalp and hands<br>• test curls recommended for color treated hair or hair in delicate condition; instructions given for test curl<br>• instructions for keeping waving lotion and neutralizer (Miracle Mist) out of eyes, ears nose and mouth and what to do if spilled<br>• only use plastic curlers<br>• remove jewelry<br>• instructions very simple |

**In 1988:**

- cautions listed under "caution"
- harmful if swallowed—keep away from children
- more explicit cautions
- explicit regarding effects of permanent if hair and scalp are not in good condition
- warning about keeping plastic cap out of reach of babies and children—may cause suffocation
- large print
- starbursts highlighting maximum times and important steps
- 800 number for questions or comments

## SUMMARY OF CHANGES:

1. *In each case there are additional instructions in the later label.*

2. *There are more graphics and pictures.*

3. *Instructions are simpler.*

4. *Print size is larger.*

5. *Procter & Gamble continues research and development on products, packaging, labels and directions throughout the life of a product. Feedback from consumers — from calls and letters, market research and focus groups — is used in making decisions about product changes and improvement.*

READ OTHER SIDE FIRST

1988

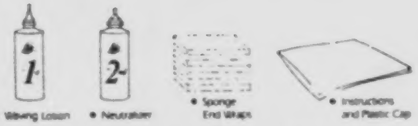
# Perming Instructions

**READ THESE INSTRUCTIONS COMPLETELY BEFORE PERMING**

## 1 Gather Your Materials

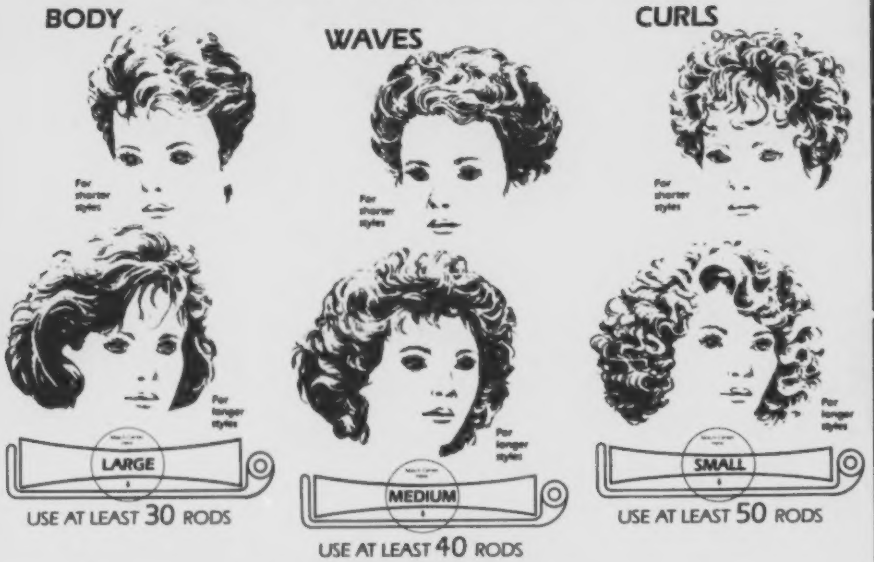
- Plastic Rattail Comb
- Scissors
- Clock or Timer
- Shampoo
- Towels (Bath Size)
- Petroleum Jelly
- Plastic Perm Rods - USE AT LEAST 30 FOR BODY, 40 FOR WAVES, 50 FOR CURLS
- Plastic Coated Clips or Bobby Pins

Your kit contains:



## 2 Pick The Correct Perm Rods For Your Desired Hair Style

- **The smaller the rod, the tighter the curl; the larger the rod the looser the wave.**



## 3 Read This Important Advice About Perming

For a beautiful perm, FOLLOW ALL INSTRUCTIONS CAREFULLY. Since perming is a chemical process that alters the hair, you must follow instructions to perm successfully and avoid problems.

**BE SURE YOUR HAIR AND SCALP ARE IN GOOD CONDITION**

- Do not perm if your scalp is sore or scratched. Perming may irritate tender scalp.
- Do not perm if your hair has been permed, straightened, bleached or highly lightened or frosted in the last 3 months. Perming can result in temporary hair damage or loss.
- Do not perm if your hair has been treated with henna or color restorers (metallic dyes) in the past 3 months. Perming may give spotty results or discolored hair.
- Always check your hair condition with the Pre-Perm Hair Condition Test, after you prepare your hair.
- If your hair is color-treated, your hair may not be in good condition. Be sure to do the Pre-Perm Hair Condition Test.
- If you have well water containing iron, perming may cause temporary discoloration to light colored hair. Be sure to do the Pre-Perm Hair Condition Test.

**CAUTIONS**

- Waving lotion is harmful if swallowed. Keep away from children.
- Avoid getting waving lotion in eyes. If this happens, immediately rinse eyes thoroughly with water, to avoid possible irritation.
- Keep waving lotion away from sensitive face, ear and neck areas by careful application and blocking drips with towel. Immediately rinse off any drips thoroughly with water to avoid possible irritation.
- If you need to stop the perm immediately for any reason, thoroughly rinse the waving lotion, apply neutralizer as shown in the instructions, rinse and then shampoo.
- If hands are sensitive or if you perm frequently, wear rubber or plastic gloves. Wash hands after perming. Discard leftovers.
- Remove jewelry before perming, metal objects can become discolored or can discolor lotion or hair.
- Warning: Keep plastic cap out of reach of babies and children. May cause suffocation.

## 4 Prepare and Test the Condition of Your Hair

### PREPARE YOUR HAIR

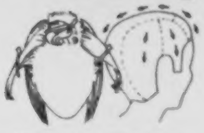
- Trim split ends.
- Shampoo and rinse your hair. DO NOT USE A CONDITIONER BEFORE PERMING.
- Towel dry hair, but leave damp.
- Cover neck and shoulders with a dry towel.
- Don't perm in cool or drafty area, since perm may not take as well.

### PRE-PERM HAIR CONDITION TEST

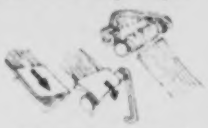
- Roll two curls at crown or where hair is in poorest condition.
- Apply waving lotion to the curls.
- Unroll a curl after 10 minutes. If it feels gummy or sticky, immediately follow the RINSE & NEUTRALIZE STEPS in STEP 7 on back of page. DO NOT PERM UNTIL YOUR HAIR IS IN BETTER CONDITION.
- If your curls do not feel gummy or sticky, follow TIMING/CHECK CURL in STEP 6, then RINSE & NEUTRALIZE in STEP 7 on back of page. If your test curls, when dry, are not frizzy, discolored or easily broken, you're ready to perm. Just roll the two curls out of the way, so you won't perm them again.

90 95

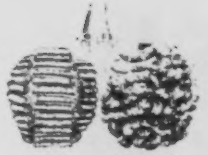
## 5 Sectioning and Roll-Up Tips



- Part clean, damp hair into sections.
- Each section should be NO WIDER than length of the rod you choose.
- Pin up sections you're not rolling, to keep out of the way.
- For each curl, part off a thin hair strand, ¼-½" thick, and no wider than length of rod.
- Hold strand straight out from head and comb smooth. Roll hair in direction of arrows.

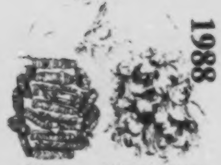


- Fold sponge end wrap around strand. Slide down over ends covering tips completely.
- Place perm rod under end wrap and wind under, firmly and evenly toward scalp. Fasten clasp across top.
- Spread hair evenly across rod and don't bunch ends. SMOOTHNESS PREVENTS FRIZZ.
- Don't put too much hair on rod or roll too tightly, to avoid hair breakage.



**Good Roll-Up = Beautiful Perm**

- Use 30-40 rods for body, 40-50 for waves, 50-60 for curls.
- ¼" to ½" parting (amount of hair matches length and thickness of rod).
- Enclose all hair ends in end wraps (no loose ends).
- Spread hair evenly across rod.
- Wind hair snuggly to scalp.



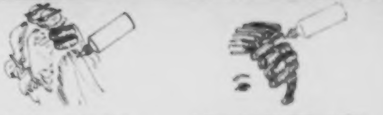
**Poor Roll-Up = Frizzy Uneven Perm**

- Too few rods.
- Greater than ½" parting (too much hair on rod).
- Hair ends not enclosed in end wraps (ends sticking out).
- Hair bunched on rod.
- Hair wound too loosely.

## 6 Choose Method A or B and Begin Perming

### A Lotion Roll-Up Method

- [illegible]
- [illegible]



- Hair should be wet before rolling.
- Shake waving bottle well and snip tip off.
- Part hair section the width and thickness of rod. Hold hair out from head.
- Apply waving lotion thoroughly to each tress of hair and comb through before rolling. Use ½ of waving lotion by the end of the roll-up process.
- Begin rolling hair by starting at the crown of the head working down to the neckline, then sides, and front.
- For sensitive skin, after hair is rolled, apply petroleum jelly to skin at hair line. Thoroughly wash off after perm.
- After roll-up is complete, saturate the curls using ALL REMAINING WAVING LOTION.
- Blot up drips on skin with towel.
- Begin timing.
- **DO NOT USE PLASTIC CAP NOW** (see Step 7 - **LOCK IN PERM**)

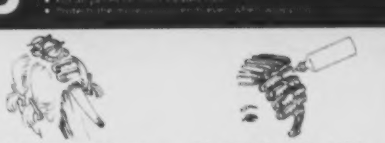
#### Timing

| | |
|---|---|
| **First Curl Check** | **15 MINUTES** |
| **Additional Curl Check Every** | **5 MINUTES** |
| **Maximum Time** | **25 MINUTES** |

***DO NOT EXCEED MAXIMUM TIME or temporary hair damage or loss may result.**

### B Water Roll-Up Method

- [illegible]
- [illegible]
- [illegible]



- Keep hair wet while rolling for easier wrap. Rewet each section if needed. DO NOT USE WAVING LOTION.
- Part hair section the width and thickness of rod. Hold hair out from head and comb smooth.
- Begin rolling hair, starting with any section.
- After roll-up is complete, shake waving lotion well and snip tip off.
- For sensitive skin, after hair is rolled, apply petroleum jelly to skin at hair line. Thoroughly wash off after perm.
- Apply waving lotion to every curl. USE ALL THE LOTION.
- Blot up drips on skin with towel.
- Begin timing.
- **DO NOT USE PLASTIC CAP NOW** (see Step 7 - **LOCK IN PERM**)

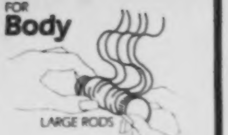
#### Timing

| | |
|---|---|
| **First Curl Check** | **15 MINUTES**<br>**10 MINUTES** for color treated hair |
| **Additional Curl Check Every** | **10 MINUTES**<br>**5 MINUTES** for color treated hair |
| **Maximum Time** | **35 MINUTES**<br>**30 MINUTES** for color treated hair |

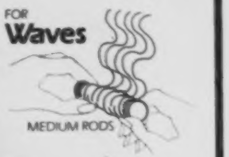
***DO NOT EXCEED MAXIMUM TIME or temporary hair damage or loss may result.**

### Curl Check

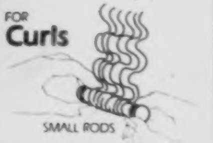
FOR **Body**



FOR **Waves**



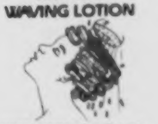
FOR **Curls**



- Partially unroll one curl in the crown area and push up toward scalp until S-shape is formed.
- Compare with pictures above.
- If S-shape indicates wave is not ready, reroll and continue timing. Check different curl each time until curl is ready OR until maximum time is reached.*
- Continue with **RINSE WAVING LOTION** in Step 7.

## 7 Rinse

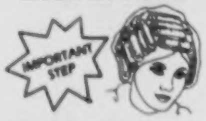
**WAVING LOTION**



- Rinse hair on perm rods with warm water for **3 MINUTES**.
- Gently but thoroughly blot excess water with towel.

(Failure to rinse can result in temporary hair damage or loss.)

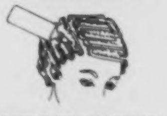
### Lock In Perm



- After waving lotion is rinsed put the plastic cap over rods and secure.
- **WAIT 15 MINUTES,** then remove plastic cap.

(Unlike other methods, this step gives a stronger perm with no risk of damage since waving lotion has been rinsed off.)

### Neutralize

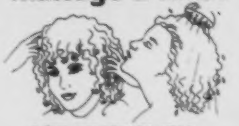


- SHAKE NEUTRALIZER BOTTLE WELL and snip tip.
- Apply neutralizer to every curl using all the neutralizer.

(Failure to neutralize can result in temporary hair damage or loss.)

- **WAIT 5 MINUTES.**

### Massage & Rinse



- Gently remove the rollers without pulling or tugging.
- With fingers, gently work neutralizer through to the ends of hair.
- Rinse thoroughly with lots of warm water.
- Blot dry with towel.

## 8 Style

Your new perm is now ready for your favorite style. You can set it wet on rollers, and dry with a hair dryer or dry completely and set with electric heat curlers or curling wand. DO NOT pull or stretch hair. Wait at least a day before shampooing or styling with heat devices. Wait 1 week before coloring your hair. Check hair condition before frosting. Wait 3 months before perming again.

**QUESTIONS OR COMMENTS? If you have any questions or comments about Lilt, please call us toll-free at 1-800-262-1637.**

ABB13-2

96

1958

**MIRACLE MIST**

# New Lilt

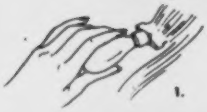
**with neat, easy** Speed Bath Set

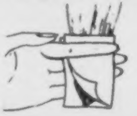
*in addition . . . you will need:*

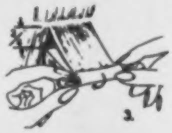
- Shampoo
- Comb
- Scissors
- Any home permanent curlers
- Bath towel
- Large pitcher
- Clock

## HOW TO WIND CURLS

- The method of winding each curl is the same. After using the Squeeze Bottle to comb lotion through the hairstrand as shown in Picture 1, fold an end paper around it. Be sure the end paper covers all the hair ends. See Picture 2.
- Place the curler under the end paper and wind under smoothly and evenly. See Picture 3.


1.


2.

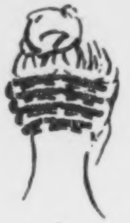

3.

- Avoid "bunching" the hair in the center of the curler. Use your finger tips to spread hair along the curler as you wind. The waving lotion does its best job when the hair is firmly and evenly wound.
- The curler should be securely fastened making especially sure that it cannot slip.
- In resaturating the wound curl it is very important to soak the curl all the way through. Hold the lotion bottle with Saturator Tray under the wound curl. Place the squeeze-comb tip against the curl and gently squeeze lotion into every curl.

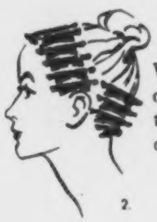
## WHERE TO WIND CURLS

### *neckline section*

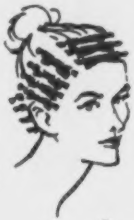
Wind this section first. Tie front and crown hair out of the way, then start with the upper row, apply lotion and wind curlers close to scalp. See Picture 1.


1.

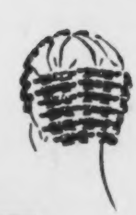
### *front section*


2.

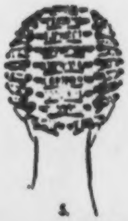
Wind this section next. For a center or side part, wind as shown in Picture 2. If you wear bangs, place curlers as shown in Picture 3.


3.

### *crown section*



Wind this section last. For end curls in a smooth-crown style, wind hair to an inch above the point where you want curl. See Picture 4. For curly-top style, wind curlers all the way to scalp (but not uncomfortably close), using additional curlers as shown in Picture 5.


5.

## IMPORTANT

### *advice before waving*

- *If your scalp is tender, sore or scratched,* postpone permanent until condition clears up.
- *If your hands are sensitive or irritated, or if you give home permanents frequently,* wear rubber gloves.
- *If your hair is bleached, color treated, or in delicate condition* (dry, brittle, breaking off, etc.) make test curls to determine whether your hair can take a wave. (Split ends should be trimmed.)
  Go through the entire waving procedure on two strands which show the maximum effect of bleach or color treatment, or which are in a delicate condition. If *at any time* these strands feel sticky or gummy, use Miracle Mist at once and do not wave any more of your hair. If your test curls, when dry, are frizzy, discolored, break easily or show any other signs of hair damage, return the unused portion of this kit to me, in exchange for another LILT to use when your hair is in better condition for waving.
- *Keep waving lotion and Miracle Mist* out of eyes, ears, nose, and mouth. If any lotion or Miracle Mist reaches these or any other sensitive area, rinse immediately with clear water. (A water rinse will also help to avoid stains from spills on clothing or furniture.)
- *Remove rings and other jewelry before giving the permanent.*
- *Use only home permanent curlers.*
- *Be sure to write to me for advice on any hair care questions.*

**Katherine Potter**
**c/o LILT Home Permanent**
**Procter & Gamble**
**Cincinnati 1, Ohio**

# NEW EASY DIRECTIONS

*FIRST trim, shampoo. Leave hair slightly damp. Fill plastic Squeeze Bottle with LILT Waving Lotion. Read "How to Wind Curls" and "Where to Wind Curls" on other side.*

## WINDING

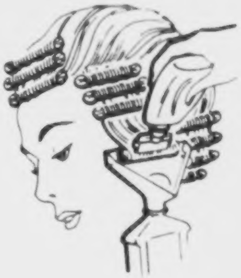
. . . start at neckline section; then front; then top. Take hairstrand wide as a curler and about ¾" deep.

1

*saturate* hair with comb-tip applicator, gently squeezing bottle and combing lotion through to very end of hairstrand.

*fold end-paper* over hairstrand; wind under smoothly on curler.

*resaturate* after winding curls: Refill Squeeze Bottle, then screw Saturator Tray tightly onto neck of glass lotion bottle. Hold bottle so that Saturator Tray is under wound curl as you squeeze lotion through curl. Any lotion which runs back into the lotion bottle should be used to refill Squeeze Bottle until all curls are resaturated.



## TIMING

2

. . . leave hair on curlers and wait 10 minutes (or for a loose casual wave wait 5 minutes, for a very curly wave wait 20 minutes.) Then . . .
*rinse* wound curls with comfortably hot water. (Use spray or several pitcherfuls of water.)

*blot* very thoroughly, still leaving curlers in place.

*cover* head with towel for 30 minutes. While timing your wave, empty both sides of the Miracle Mist packet into a large clean pitcher. Then pour in just 2 cups of comfortably hot water. Stir gently. Rinse Squeeze Bottle, then fill with Miracle Mist. Empty and rinse lotion bottle, and replace Saturator Tray on neck of lotion bottle as before.

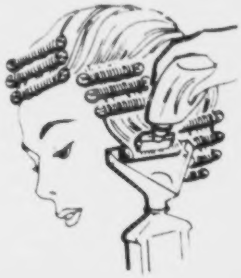
## USING MIRACLE MIST

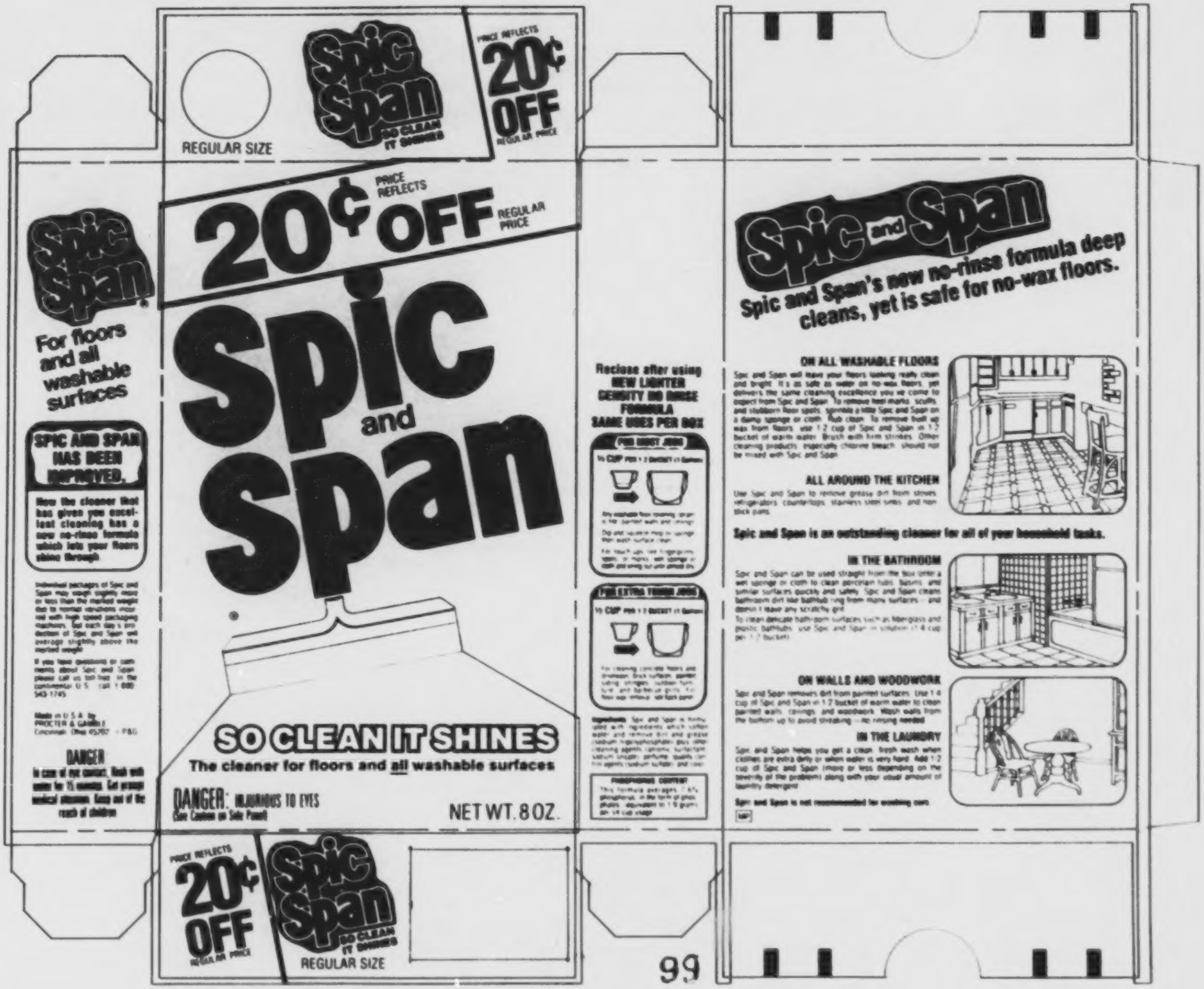
3

**IMPORTANT** . . . using Saturator Set, squeeze Miracle Mist into curl, holding Saturator Tray underneath. Soak each curl. Refill Squeeze Bottle with fresh Miracle Mist; *soak each curl again.*

*remove curlers* and pour rest of Miracle Mist through loosened hair, spreading curly ends to make sure every hair is well soaked.

*rinse hair* thoroughly with lukewarm water. Your LILT Wave is finished, ready to set in your favorite hairstyle.





Spic Span
SO CLEAN IT SHINES

REGULAR SIZE

PRICE REFLECTS 20¢ OFF REGULAR PRICE

**Spic Span**

For floors and all washable surfaces

**SPIC AND SPAN HAS BEEN IMPROVED.**

Now the cleaner that has given you excellent cleaning has a new no-rinse formula which lets your floors shine through.

Individual packages of Spic and Span may weigh slightly more or less than the marked weight due to normal variations incurred with high speed packaging machines. But each day's production of Spic and Span will average slightly above the marked weight.

If you have questions or comments about Spic and Span, please call us toll-free. In the continental U.S. call 1-800-543-1745.

Made in U.S.A. by
PROCTER & GAMBLE
Cincinnati, Ohio 45202 ©P&G

**DANGER**

In case of eye contact, flush with water for 15 minutes. Get prompt medical attention. Keep out of the reach of children.

20¢ PRICE REFLECTS OFF REGULAR PRICE

# Spic and Span

**SO CLEAN IT SHINES**

The cleaner for floors and all washable surfaces

**DANGER:** INJURIOUS TO EYES
(See Caution on Side Panel)

NET WT. 8 OZ.

**Reclose after using
NEW LIGHTER
DENSITY NO RINSE
FORMULA
SAME USES PER BOX**

**FOR MOST JOBS**

¼ CUP PER 1/2 BUCKET (1 Gallon)

[illegible]

Dip and squeeze mop or sponge, then wash surface clean.

For touch-ups like fingerprints, spots, or marks, wet sponge or cloth and wring out until almost dry.

**FOR EXTRA TOUGH JOBS**

½ CUP PER 1/2 BUCKET (1 Gallon)

For cleaning concrete floors and driveways, brick surfaces, painted siding, shingles, outdoor furniture and barbecue grills. For floor wax removal, see back panel.

**Ingredients:** Spic and Span is formulated with ingredients which soften water and remove dirt and grease (sodium tripolyphosphate) plus other cleaning agents (anionic surfactant, sodium silicate), perfume, quality control agents (sodium sulfate) and color.

**PHOSPHORUS CONTENT**
This formula averages 7.6% phosphorus, in the form of phosphate, equivalent to 1.9 grams per 1/4 cup usage.

## Spic and Span

**Spic and Span's new no-rinse formula deep cleans, yet is safe for no-wax floors.**

### ON ALL WASHABLE FLOORS

Spic and Span will leave your floors looking really clean and bright. It's as safe as water on no-wax floors, yet delivers the same cleaning excellence you've come to expect from Spic and Span. To remove heel marks, scuffs, and stubborn floor spots, sprinkle a little Spic and Span on a damp sponge or cloth. Rub clean. To remove built-up wax from floors, use 1/2 cup of Spic and Span in 1/2 bucket of warm water. Brush with firm strokes. Other cleaning products, especially chlorine bleach, should not be mixed with Spic and Span.

### ALL AROUND THE KITCHEN

Use Spic and Span to remove greasy dirt from stoves, refrigerators, countertops, stainless steel sinks, and non-stick pans.

**Spic and Span is an outstanding cleaner for all of your household tasks.**

### IN THE BATHROOM

Spic and Span can be used straight from the box onto a wet sponge or cloth to clean porcelain tubs, basins, and similar surfaces quickly and safely. Spic and Span cleans bathroom dirt like bathtub ring from many surfaces — and doesn't leave any scratchy grit.

To clean delicate bathroom surfaces such as fiberglass and plastic bathtubs, use Spic and Span in solution (1/4 cup per 1/2 bucket).

### ON WALLS AND WOODWORK

Spic and Span removes dirt from painted surfaces. Use 1/4 cup of Spic and Span in 1/2 bucket of warm water to clean painted walls, ceilings, and woodwork. Wash walls from the bottom up to avoid streaking — no rinsing needed.

### IN THE LAUNDRY

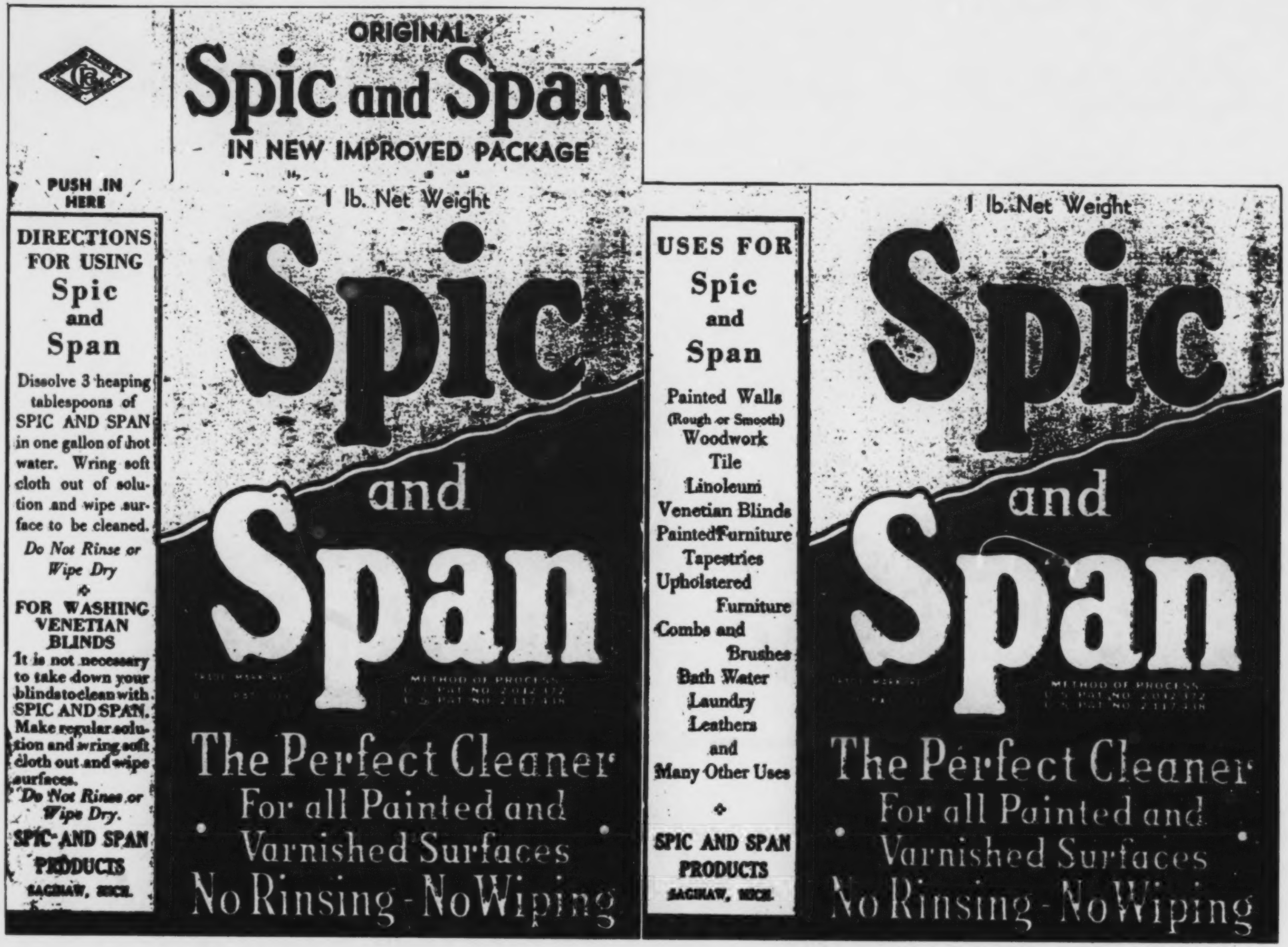
Spic and Span helps you get a clean, fresh wash when clothes are extra dirty or when water is very hard. Add 1/2 cup of Spic and Span (more or less depending on the severity of the problem) along with your usual amount of laundry detergent.

**Spic and Span is not recommended for washing cars.**

PRICE REFLECTS 20¢ OFF REGULAR PRICE

Spic Span
SO CLEAN IT SHINES

REGULAR SIZE



PUSH IN HERE

**DIRECTIONS FOR USING Spic and Span**

Dissolve 3 heaping tablespoons of SPIC AND SPAN in one gallon of hot water. Wring soft cloth out of solution and wipe surface to be cleaned.

*Do Not Rinse or Wipe Dry*

✧

**FOR WASHING VENETIAN BLINDS**

It is not necessary to take down your blinds to clean with SPIC AND SPAN. Make regular solution and wring soft cloth out and wipe surfaces.

*Do Not Rinse or Wipe Dry.*

**SPIC AND SPAN PRODUCTS**

SAGINAW, MICH.

ORIGINAL

**Spic and Span**

IN NEW IMPROVED PACKAGE

1 lb. Net Weight

**Spic and Span**

TRADE MARK REG. U. S. PAT. OFF.

METHOD OF PROCESS
U. S. PAT. NO. 2,012,372
U. S. PAT. NO. 2,117,438

The Perfect Cleaner
For all Painted and Varnished Surfaces
No Rinsing - No Wiping

**USES FOR Spic and Span**

Painted Walls (Rough or Smooth)
Woodwork
Tile
Linoleum
Venetian Blinds
Painted Furniture
Tapestries
Upholstered Furniture
Combs and Brushes
Bath Water
Laundry
Leathers
and
Many Other Uses

✧

**SPIC AND SPAN PRODUCTS**

SAGINAW, MICH.

1 lb. Net Weight

**Spic and Span**

TRADE MARK REG. U. S. PAT. OFF.

METHOD OF PROCESS
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The Perfect Cleaner
For all Painted and Varnished Surfaces
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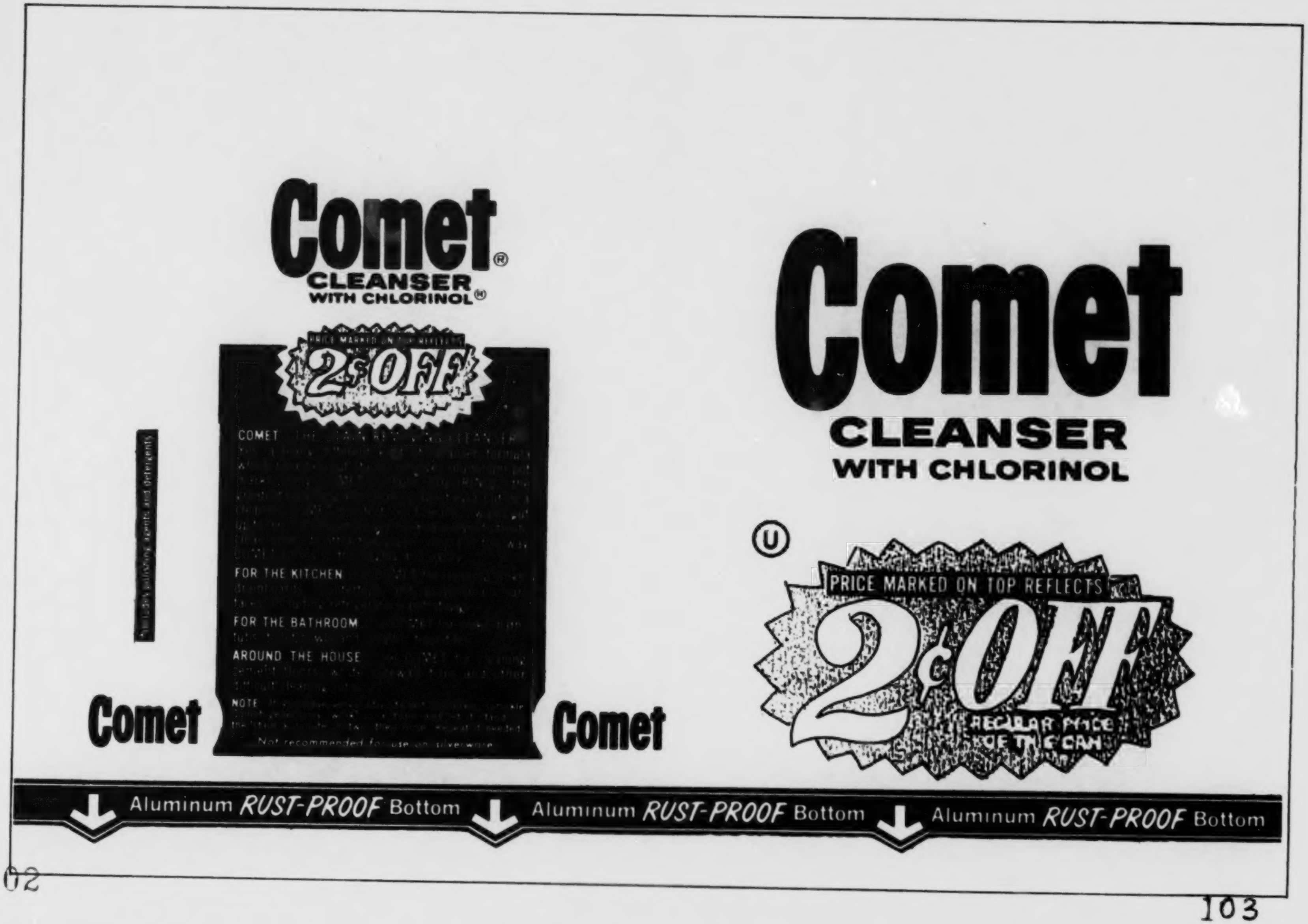
Comet®
CLEANSER
WITH CHLORINOL®
PRICE MARKED ON TOP REFLECTS
2¢ OFF
polishing agents and detergents
COMET
FOR THE KITCHEN
FOR THE BATHROOM
AROUND THE HOUSE
NOTE
Not recommended for use on silverware
Comet
Comet
Comet
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WITH CHLORINOL
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PRICE MARKED ON TOP REFLECTS
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REGULAR PRICE
OF THE CAN
Aluminum RUST-PROOF Bottom
Aluminum RUST-PROOF Bottom
Aluminum RUST-PROOF Bottom

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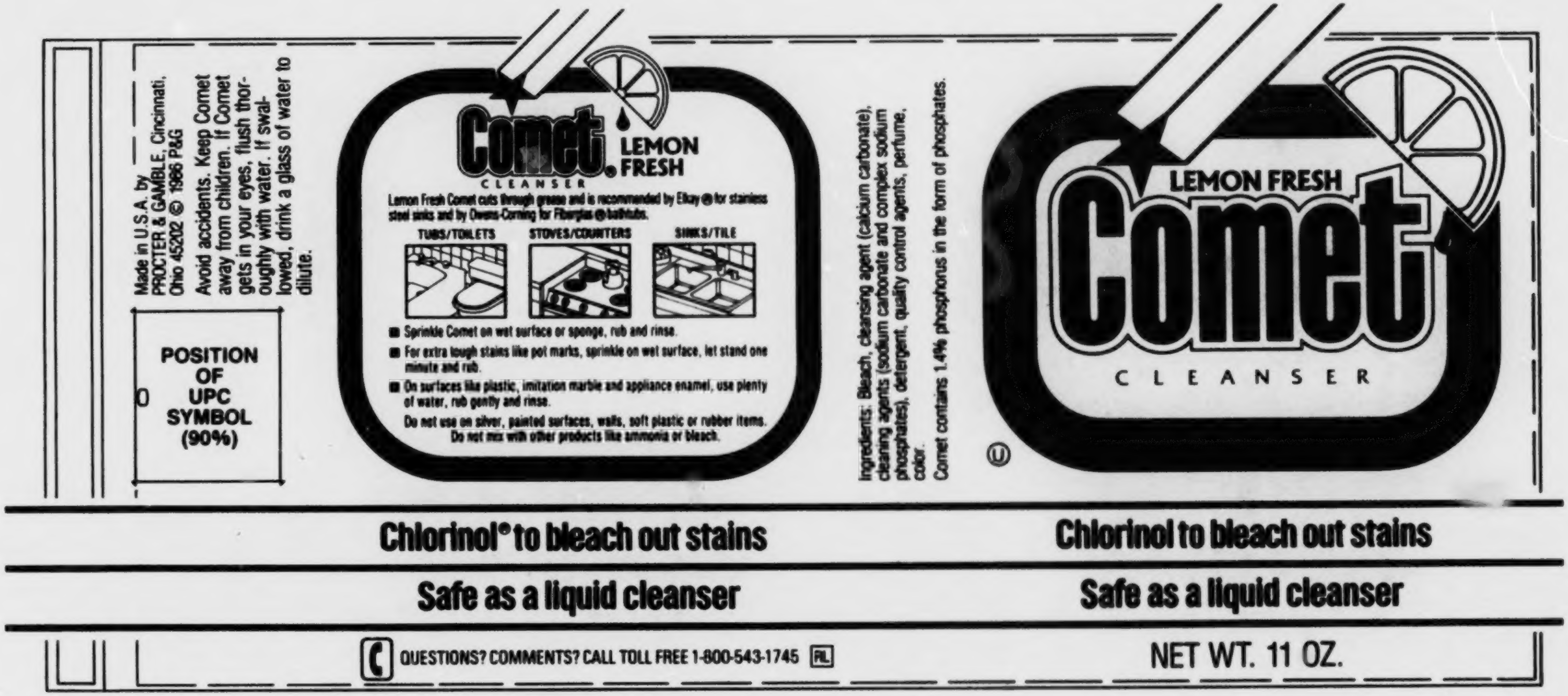

Made in U.S.A. by
PROCTER & GAMBLE, Cincinnati,
Ohio 45202 © 1986 P&G

Avoid accidents. Keep Comet away from children. If Comet gets in your eyes, flush thoroughly with water. If swallowed, drink a glass of water to dilute.

POSITION
OF
UPC
SYMBOL
(90%)

0

**Comet® CLEANSER LEMON FRESH**

Lemon Fresh Comet cuts through grease and is recommended by Elkay® for stainless steel sinks and by Owens-Corning for Fiberglas® bathtubs.

- Sprinkle Comet on wet surface or sponge, rub and rinse.
- For extra tough stains like pot marks, sprinkle on wet surface, let stand one minute and rub.
- On surfaces like plastic, imitation marble and appliance enamel, use plenty of water, rub gently and rinse.

Do not use on silver, painted surfaces, walls, soft plastic or rubber items.
Do not mix with other products like ammonia or bleach.

Ingredients: Bleach, cleansing agent (calcium carbonate), cleaning agents (sodium carbonate and complex sodium phosphates), detergent, quality control agents, perfume, color.
Comet contains 1.4% phosphorus in the form of phosphates.

Ⓤ

**LEMON FRESH Comet CLEANSER**

**Chlorinol® to bleach out stains**

**Safe as a liquid cleanser**

**Chlorinol to bleach out stains**

**Safe as a liquid cleanser**

QUESTIONS? COMMENTS? CALL TOLL FREE 1-800-543-1745

NET WT. 11 OZ.

104

105

STUDENT
ACTIVITY

# Super Sleuth

**Locate all of the household chemicals you can find in your home. List according to the room or storage area. Beside the product, label as follows:**

- **P (poison)** if the word "poison" and/or a skull and crossbones appears on the label
- **D (danger)** if the word "danger" appears on the label or it indicates it is extremely flammable, toxic or corrosive
- **C (caution)** if the word "caution" or "warning" appears
- **Leave blank** if none of these statements are on the label

**KITCHEN (excluding food)** **BATHROOM/BEDROOM**

| Product | Label | Product | Label |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**CLEANING CLOSET/SHELF** **LAUNDRY/STORAGE AREA**

| Product | Label | Product | Label |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
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| | | | |

**GARAGE, BASEMENT OR AREA WHERE PAINT PRODUCTS AND PRODUCTS USED OUTSIDE ARE STORED**

| Product | Label | Product | Label |
|---|---|---|---|
| | | | |
| | | | |

STUDENT
ACTIVITY

# Super Sleuth Summary Sheet

___Total number of household chemical products (excluding food)

___ Number labeled "caution" or "warning"

___ Number labeled "danger"

___ Number labeled "poison"

___ Number not labeled "caution," "warning," "danger" or "poison."

**What types of products (such as medicines, personal care products, detergents, household cleansers, paint products and pesticides) contain:**

1. None of these labels?

2. A "caution" or "warning" label?

3. A "danger" label?

4. A "poison" label?

# Activity 2: If Only I ........

## The Case for Safe Product Use

**Overview**

Students make decisions regarding safe use, storage and disposal of household products. They examine the concern of businesses for foreseeable consumer misuse. Special attention is given to prevention and treatment of children's accidental poisoning.

**Time required**

Two class periods plus homework

**Home Economics content**

Poison prevention, symptoms and treatment
Use, storage and disposal of household chemical products

**Learning objectives**

Students who complete this unit should be able to:

1. Make decisions related to safe use, storage and disposal of household chemical products.
2. Identify symptoms and treatments for poisons which are swallowed, come into contact with skin or eyes, or are inhaled.
3. Describe special precautions for product use, storage and disposal when there are young children in the home.
4. Identify sources of reliable information regarding safe product use, storage and disposal.
5. Understand that product safety requires planning for foreseeable consumer misuse as well as intended use.

**Advance preparation**

1. Collect news clippings of accidents related to household chemical products.
2. Provide child development textbooks as resources.
3. Duplicate for students, ACCIDENTAL POISONINGS: SYMPTOMS AND TREATMENTS, A GUIDE TO SAFE DISPOSAL OF HOUSEHOLD CHEMICALS and CONSUMER BLOOPERS.
4. Invite a resource person to discuss accidental poisoning.

**Teaching strategies**

1. To introduce unit, display news clippings of accidents related to household chemical products or put these statements on the board or transparency:

- 2-year-old child dies after swallowing a half bottle of aspirin.
- 24-year-old severely injured when she tossed an aerosol container into an open fire.
- 4-year-old burned when he spilled drain cleaner on himself.

2. Divide students into small groups and assign them the task of developing lists of do's and don't's for safe use, storage and disposal of household products. Compile and post one classroom list. (See Teacher's Resource Material for suggested listing). Add to the list during the activities in the unit.

3. Assign a child's stage of development to each of four groups: 0 to 6 months; 6 to 12 months; 1 year and 2 to 5 years. Provide child development textbooks and information on children's safety to the class as resources. Ask students to describe physical characteristics for that age of child and to develop poison prevention guidelines. Ask each group to share its findings with the total class.

Suggested responses:

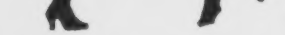
> **0 to 6 months**: *Characteristics*: By 3 to 4 months can reach for objects; by 5 to 6 months can sit alone briefly. *Poison prevention guidelines*: Keep baby powder and lotions out of reach; purchase items with child-resistant caps; post the telephone number for poison control center; purchase 1 ounce of syrup of ipecac.
>
> **6 to 12 months:** *Characteristics:* Can pull self up; sits steadily; holds and drinks from cup; by 11 to 12 months may walk alone; constantly explores. *Poison prevention guidelines:* Keep all dangerous items such as cleansers, drugs, paints, solvents and insecticides out of reach; remove poisonous house plants.
>
> **1 year:** *Characteristics:* Picks up small objects using thumb and forefinger; walks alone; active and exploring, particularly in low storage areas. *Poison prevention guidelines:* Recheck home for dangerous items; keep items in locked storage areas where necessary; look for child when using products which should be kept out of reach of children.
>
> **2 to 5 years:** *Characteristics:* Runs, walks up and down stairs; can reach higher places; can open jar lids; tests limits. *Poison prevention guidelines:* Recheck home for dangerous items; do not assume child understands poison warnings; continue to keep all dangerous items out of reach and locked; buy items with child-resistant caps.

4. Duplicate and distribute Student Reading, ACCIDENTAL POISONINGS: SYMPTOMS AND TREATMENTS. Invite a resource person from a poison control center or a hospital emergency room to visit the class to discuss accidental poisoning — cause, prevention and treatment.

5. Assign pairs of students to develop a "caregiver's lament." Each pair will present a skit based on statements made by caregivers who arrive in the hospital emergency rooms with children. Sample statements:

- a. I just left her for a moment. If only. . .
- b. He's never done that before. If only. . .
- c. I left it on the counter while I got his bottle. If only. . .
- d. I didn't know she could reach it. If only. . .
- e. I didn't think he could open it. If only. . .
- f. Her brother never did that. If only. . .
- g. I wish I hadn't called my medicine "candy". . .
- h. I wish I had. . .

6. Have the students brainstorm a list of situations which may reduce the attention of the parents or caregivers to children such as illness, moving, having guests, holidays, housecleaning and vacationing. For each situation, ask students to describe additional precautions which should be taken to prevent accidents.



7. Have the students develop a set of survey questions related to product safety and survey three families. Sample questions:

- a. If there are children in your home, what are their ages?
- b. What safety features do you look for when purchasing household chemical products?
- c. Do you carefully read and follow label directions on household chemical products?
- d. Where do you store household chemicals such as paints? oven cleaners? bleach?
- e. Do you follow disposal instructions?

As a class summarize findings and draw conclusions.

8. As an FHA/HERO or service project, plan poison prevention activities such as the following:

- a. Distribute poison labels for toxic products to families with young children.
- b. Develop safety slogans for use in public service announcements or displays, e.g., "Children act fast — so do poisons."
- c. Create safety posters and displays in the community.
- d. Present "caregiver's lament" skits to community groups.

9. Assign Student Reading, A GUIDE TO SAFE DISPOSAL OF HOUSEHOLD CHEMICALS. Clarify terminology.

10. Assign each of these case studies to a small group of students. For each situation:

- a. Describe circumstances likely to contribute to the person's action.
- b. Describe likely consequences to people.
- c. Describe likely consequences to the environment.
- d. Predict what might happen if everyone did the same.

**Case 1** - Ann has a closet full of specialty cleaners; she has a cleaner for almost every surface and appliance in her home.

**Case 2** - John is moving and wants to get rid of most of his household products. He discards half empty aerosol containers in the garbage, pours pesticides down the drain and empties a disinfectant bottle into a soft drink bottle.

**Case 3** - Susan changed the oil in her car and poured the used oil out at the curb hoping it would go down the street drain.

**Case 4** - Bill's medicine cabinet is full of medicines of every description. Several have expired. He also stores a variety of products, including drain cleaners, in the medicine cabinet.

(Teacher's note: Refer students to Student Reading, A GUIDE TO SAFE DISPOSAL OF HOUSEHOLD CHEMICALS as a reference.)

11. Distribute Student Activity, CONSUMER BLOOPERS. Read the safety policy statement. Clarify what is meant by intended use and by foreseeable misuse.

    a. Divide the class into teams to play a game, CONSUMER BLOOPERS. Assign each team a number or let them choose a creative name. Tell each team to brainstorm and develop a list of possible ways consumers might misuse each of the four products.

    b. Compare lists from each team. Cross off items which appear on another team's list. Assign one point for items unique to a team's list. The team with the most points wins. The teacher is arbiter to determine what responses are reasonable.

STUDENT
READING

# A Guide to Safe Disposal of Household Chemicals

Just as household chemical products must be used according to directions, they must also be disposed of safely. The safe disposal of household chemicals requires two tests:

1. Will it harm people?
2. Will it harm the environment?

Most household wastes can be disposed of safely. Laundry detergents, soaps and most household cleansers are intended to go down the drain in normal use. The best disposal method is to use as much of the product as possible. If some of the product remains, dilute with water and flush down the drain. Do not put more than one product down the drain at a time. Household chemical products should NOT be mixed.

Hazardous waste materials include poisons, acids, paints and solvents. Use and reuse as much as possible. Solidify liquid wastes — for example, leave paint can lids open to dry leftover paint. Then put the cans in the trash. NEVER dispose of hazardous wastes down the sink drain or into the sewer system. Do not burn or dump any hazardous wastes on the ground.

The Environmental Protection Agency (EPA) suggests the following guidelines for safe product disposal:

1. **Acids and alkalines.** Acids and alkalines are the main ingredients in some cleaning compounds and in drain openers. Use these materials completely according to label directions whenever possible. These products are highly usable even when a few years old.

2. **Aerosols.** Be sure to empty aerosol containers completely before disposing with other trash to prevent an explosion hazard. Purchase pump sprays instead of aerosols when available.

3. **Antifreeze.** Animals and children are attracted to the sweet taste of antifreeze. Don't pour it on the ground. Used antifreeze can be diluted thoroughly with water and poured down the drain.

4. **Bleach.** NEVER mix chlorine bleach with ammonia or acidic products such as drain, toilet bowl and metal cleaners. Toxic fumes (strong enough to be fatal) will result. Even old chlorine bleach can still be used and is harmful when mixed with such products.

5. **Cleaners and polishes.** Cleaners and polishes (furniture polish and rug, floor and oven cleaners) should be used completely whenever possible. Seal empty containers and dispose of them with the rest of your garbage.

6. **Disinfectants.** Disinfectants contain strong chemicals so use them completely according to label instructions and with caution.

7. **Gasoline.** Avoid buying more than you can use in six months. Store in a cool dry place. Use completely by mixing old gasoline with fresh gasoline. Store in an approved container.

8. **Insecticides.** Use insecticides according to label directions. Avoid disposal whenever possible. If you can't use the material, see if a neighbor or garden club can. Never reuse the containers.

9. **Paint.** Small amounts of paint can be hardened by taking the lid off the can. Once the paint is solid, you can put it in the trash.

10. **Solvents.** You can clean used solvents (paint thinner, turpentine, varnish) by allowing the paint or dirt particles to settle out in a container. Do not dump onto soil or down sewers, drains or the toilet.

Wastes which are dumped on the ground or in a street drain will eventually flow to surface and groundwater where they may pollute drinking water. Burning some waste products may release toxic fumes or gases into the air.

Adopt the slogan: **THINK BEFORE YOU THROW IT OUT.**

# Household Chemical Product Safety Do's and Don'ts

**DO'S**

1. Read and follow directions carefully.
2. Contact the product manufacturer if you have any questions regarding the proper use, storage or disposal of the product.
3. Always read labels before you buy a product to be sure it will meet your needs.
4. Keep hazardous substances out of the reach of children and pets. Use child-resistant caps.
5. Buy only what you need.
6. Post the telephone numbers of the poison control center, emergency room, doctor and 911 number in prominent location.
7. Give away products you cannot use. Be certain products are in their original containers which include directions.
8. Wrap the container in newspaper before placing it in the trash if the label contains a warning about not getting the contents on your skin.
9. Empty all aerosol cans by depressing the button until no more product comes out.
10. Teach children the danger of poison.
11. Discard medicines after their expiration date by flushing them down the toilet.
12. Replace child-resistant caps after using product.
13. Be aware of what products are toxic and store accordingly.
14. Reduce the number of products you buy. Many times a general purpose household cleaner can be used instead of cleaners designed for a specific purpose.
15. Use products in the recommended concentration.

**DON'TS**

1. Mix materials or wastes together.
2. Store hazardous substances in the medicine cabinet.
3. Bury containers of leftover substances.
4. Dispose of materials by pouring onto the ground or down the storm sewer.
5. Remove product labels.
6. Remove products from their original containers for storage or future use.
7. Call medicines "candy."
8. Give or take medicine in poorly lit rooms.
9. Store household chemicals on shelves normally used for foods.
10. Dump wastes by the side of the road.
11. Burn plastics, paint, insulation or other potentially hazardous materials which might produce toxic fumes.
12. Store incompatible products together. Flammables should never be stored with corrosives. Poisons should always be kept separately.
13. Store household chemicals within the reach of children.
14. Store hazardous substances in containers that are recognizable food containers.

# Accidental Poisonings:

## Symptoms and Treatments

Most accidental poisonings take place in the home. Two-year-olds are at the greatest risk of accidental poisoning? Why? Picture the average two-year-old — curious, fearless, climbing, exploring and unable to read. Then think about a bottle of aspirin left on the table, a safety cap not secured on a can of drain cleaner, a toxic houseplant within reach.

Children under the age of five are the most frequent victims of accidental poisonings. Unintentional poisonings by solids and liquids is the fifth leading cause of accidental death for children 1-15 years old and the sixth leading cause of accidental deaths for all age groups in the United States.

Deaths of elderly adults from accidental poisonings have doubled over the last 30 years. Adult poisonings most frequently occur because a toxic substance has been poured into another container such as a milk carton or soda can. Overdose of medicines or drugs is another frequent cause of accidental poisoning.

| TYPE OF POISONING | SYMPTOMS | SUGGESTED TREATMENTS |
|---|---|---|
| 1. Swallowed | Breathing difficulty vomiting, burns in mouth, unconscious | Remove anything remaining in the mouth. Call the poison control center. If advised, administer syrup of ipecac to induce vomiting. |
| 2. Poison on the skin | Burns, rash, allergic reactions | Remove wet clothing. Rinse the skin with warm water. Then wash gently with soap and water and rinse off the skin. Call the poison control center if the person is in distress. |
| 3. Poison in the eye | Burning, irritation, loss of vision | Gently hold the eyelids open. Flood the eye with lukewarm water for 10-15 minutes. Do not let the person rub his or her eyes. |
| 4. Inhaled poison | Suffocation, breathing difficulty | Immediately move the person to fresh air. Avoid breathing fumes yourself. Check pulse and breathing. Start CPR if necessary. |

Every home medicine cabinet should stock syrup of ipecac, available from a drug store.

STUDENT
READING

# General Emergency Procedures

Post the number of your poison control center, hospital emergency line, emergency squad or 911 number.

Remember to check the product label to see if there are any special instructions. If there is an 800 number listed on the label, call for information.

Be prepared to give:

1. Age and weight of the victim
2. Identity of product and ingredients
3. Estimate of amount consumed
4. Symptoms
5. Time when the ingestion or exposure occurred

If you are instructed to go to the emergency room, take the poisonous substance and container with you.

STUDENT
ACTIVITY

# Consumer Bloopers

The safety policy of the Procter & Gamble Company states that "... consumer products will be safe for intended use... and foreseeable misuse."

Brainstorm and list possible ways consumers might misuse the following products:

**TEAM**________________________________

A. **Laundry detergents**

B. **Solid shortening or cooking oil**

C. **Dishwashing detergent**

D. **Fabric softener**

# Consumer Bloopers

## Actual Cases

Following are examples of misuse of consumer products as documented by the Procter & Gamble Consumer Services Department. It should be noted that products should **only** be used as recommended by the manufacturer.

**Laundry Detergents**

bathe humans
clean carpets
clean hands
wash cars and trucks
bathe pets

**Dishwashing Detergents**

shampoo hair
spray indoor plant leaves to keep clean
clean clogged drains
soak cuts and scrapes
wash cars and trucks
wash windows
wash upholstery
use in dishwasher
use as bubble bath

**Solid Shortening or Cooking Oil**

use as hand and body lotion
use as suntan oil
polish plants
hair gel

**Fabric Softener**

reduce static shock on carpets
shine mirrors
prevent fleas in pets
repel mosquitoes on humans
use sheets in drawers to freshen clothes
rinse hair
rinse pets

# Activity 3: Consumers and Business:

## Partners in Product Safety

### Overview

Students examine the issue of product safety from both a consumer and business perspective. Issues discussed include solid waste disposal, product packaging and safety testing.

### Time required

One class period plus homework

### Home Economics content

Solid waste disposal
Packaging
Safety testing
Consumer responsibility

### Learning objectives

Students who complete this unit should be able to:

1. Become aware and concerned about the problem of solid waste disposal.
2. Evaluate packaging decisions from a perspective of conflicting values.
3. Recognize the role of testing in determining the safety of products.
4. Make responsible decisions regarding product safety issues.

### Advance preparation

1. Duplicate for students: SOLID WASTE DISPOSAL, PACKAGING DECISIONS and PARTNERS IN PRODUCT SAFETY.

### Teaching strategies

1. To introduce the concept of product safety as both a consumer and a business concern, tell students they will examine three issues: packaging, solid waste disposal and safety testing.

(More information about the solid waste issue can be found in the "Garbage Decision Making"activity in the Economics section and the "Environmental Safety" activity in the Science section of the unit.)

2. Duplicate and distribute Student Activity, SOLID WASTE DISPOSAL. Note that there is a problem in America with solid waste. As a class, discuss each of the quiz questions. Help students to think about the problem and develop a thoughtful response to the question about their responsibility as consumers. What are alternatives and consequences to the problem of solid waste disposal? Increasing landfills? Incineration? Source reduction or reducing the amount of waste produced through buying less, less packaging and product reuse? Composting? Recycling? As students develop alternatives, help them examine the universal consequences. If they suggest incineration, point out that although incineration greatly reduces the volume of solid waste in landfills, there are some potential concerns about air pollution and disposal of toxic ash. If students suggest recycling, ask them to consider what would happen if everyone recycled? Would there be a market for the increased amount of available material to recycle? Conversely, what will happen if we continue our present waste disposal practices?

As an extension activity have students determine the quantity of solid waste their family generates and analyze its contents in categories such as paper, yard waste, food waste, packaging waste and durables (appliances, etc.). Ask them to develop a plan for reducing the quantity of solid waste in their household.

3. Duplicate and distribute Student Activity, PACKAGING DECISIONS. The purpose of this activity is for students to evaluate packaging decisions from the manufacturer's perspective of conflicting values.

4. Assign one of the packaging decisions to each group of students. Ask them to prepare a defense of that packaging decision. After each group has presented, ask the class to vote for the package they would select and to defend that choice. As a class, select the packaging option for Liquid Cascade dishwasher detergent and justify the decision. Read the decision of Procter & Gamble.

5. A recent survey revealed that a majority of Americans would be willing to pay more for product packaging which is "environmentally safe." Decide as a class whether teenagers today would and should support this position. Give reasons for your conclusions. Discuss what is meant by "environmentally safe." For example, do you take into consideration not only the source of the packaging, whether it's recyclable, and how it can be disposed of, but also the energy involved in its manufacture? Do you consider the environmental impact of the processes used to obtain or create its ingredients?

6. Explain to students that product safety is a partnership between business and consumers.

   a. Assign the reading, SAFE SOAP. Help students think as businesses must of product safety in terms of humans, the environment and the materials with which the product will come in contact.

   b. Assign each of the following products to a small group of students: 1) paper towel formulated for use in microwave cooking; 2) disposable diapers; 3) anti-dandruff shampoo; 4) orange juice fortified with calcium.

   c. Each group should assume the role of product developer in charge of safety. They should identify safety issues for that product and describe how they would ensure the product would be safe for intended use.

   d. Each group should report its issues and solutions to the total class.

   e. Distribute a student activity, PARTNERS IN PRODUCT SAFETY to the class. Note that examples are case studies of actual Procter & Gamble products. Ask each group to compare its responses with the actual examples and then to share with the total class.

7. Note that businesses make a major commitment of resources to product safety. For example, Procter & Gamble states that "Above everything else, our products must be safe for consumers around the world, and we don't leave this obligation to chance." Ask students, what are our responsibilities as consumers? *(Read the directions, follow package directions for use, store as indicated, pay particular attention to cautions and warnings, use only for the purpose for which the product is intended, dispose of safely.)* Ask students to predict the consequences of product misuse and careless storage and disposal to people and to the environment. Summarize by asking students to share if they have changed how they read labels and follow directions after their study of product safety.

STUDENT
ACTIVITY

# Solid Waste Disposal

Garbage disposal isn't a very exciting topic to the average American teen. However, it may significantly affect the quality of life for your generation. Disposing of the volume of solid waste we produce is a problem and the problem is likely to get worse in your lifetime. Remember the barge loaded with tons of garbage with no place to go?

Every man, woman and child in American creates about 3.5 pounds of solid waste per day. How much solid waste does your family generate? Solid waste is everything we use and discard — paper, food, plastics, cans, glass, clothing, metal, old appliances, furniture, cars.

Solid waste creates many problems. For example, litter along the highway is ugly. Unfortunately, much of our trash stays with us for centuries. It is possible that an aluminum can may last a billion years and glass containers even longer.

Try this quiz on solid waste. Circle the correct answers.

1. The amount of solid waste per person the United States generates increases each year. a. true b. false
2. Most solid waste gets buried in landfills. a. true b. false
3. In the United States, many landfills for solid waste are a. being opened b. being closed.
4. The United States recycles what percent of its solid waste? a. 10% b. 35% c. 50%
5. Japan recycles what percent of its solid waste? a. less than 10% b. 35% c. 50%
6. The United States burns what percent of its solid waste? a. less than 10% b. 35% c. 50%
7. Sweden burns what percent of its solid waste? a. less than 10% b. 35% c. 50%
8. How much of America's solid, non-recyclable waste could be burned to generate energy? a. up to 50% b. up to 80% c. up to 98%
9. Plastic packaging accounts for what percent of United States solid waste? a. 4% b. 12% c. 19%
10. Most of our solid waste is composed of? a. food b. paper c. glass d. plastic

Manufacturers are concerned about the solid waste issue and are proactively seeking solutions. For example, Procter & Gamble is testing a new container for Spic and Span made from recycled soft drink bottles which, in turn, can be recycled into insulation, carpet backing and other goods. Products are being combined (detergent with bleach, shampoo with conditioner) to help reduce the source of solid waste. Procter & Gamble also developed new super-absorbent gel cores to make Pampers and Luvs diapers thinner. The diapers now contribute half the volume to landfills as before. Procter & Gamble recently introduced a concentrated refill for its Downy fabric softener that uses 75 percent less packaging material. The new package is aimed at reducing solid waste.

**WHAT IS OUR RESPONSIBILITY AS CONSUMERS TO HELP SOLVE THE SOLID WASTE PROBLEM IN AMERICA?**

# Solid Waste Disposal

## Answers to questions in the student activity

1. The amount of solid waste the United States generates per person increases each year.

   *b. false — The amount of solid waste remains about the same per person. The problem is that there are more people and fewer places to get rid of it.*

2. Most solid waste gets buried in landfills.

   *a. true — About 80 percent gets buried in landfills.*

3. In the United States, many landfills for solid waste are

   *b. being closed.*

4. The United States recycles what percent of its solid waste?

   *a. 10%*

5. Japan recycles what percent of its solid waste?

   *c. 50%*

6. The United States burns what percent of its solid waste?

   *a. less than 10%*

7. Sweden burns what percent of its solid waste?

   *c. 50%*

8. How much of America's solid, non-recyclable waste could be burned to generate energy?

   *c. up to 80%*

9. Plastic packaging accounts for what percent of the United States' solid waste?

   *a. 4%*

10. Most of our solid waste is composed of?

    *b. of paper — approximately one-half.*

STUDENT
ACTIVITY

# Packaging Decisions

A manufacturer must decide how to package baby lotion. The product developers meet to discuss this problem. What decisions might be made if the product developer was primarily concerned with each of these values?

Write the correct number in the blank.

**PACKAGING DECISION**

___a. Use a flip top lid for easy access

___b. Make the package from recycled materials

___c. Make the package colorful

___d. Use a child-resistant cap

___e. Use a lighter weight material to save costs

___f. Make package refillable

___g. Design the package to maximize shipping and shelf space

**VALUES**

1. Aesthetics
2. Environmental protection
3. Safety
4. Convenience
5. Economics

If you were the manufacturer, how would you rank these alternatives? Justify your packaging decision.

Procter & Gamble faced such a packaging decision with the dishwasher detergent, Liquid Cascade. Their decision involved choosing between packaging options offering more safety and less convenience and options that offered convenience, but were potentially not quite as safe. Their packaging team developed three options. Which option would you choose? Justify your response.

> **Option 1 -** Rely on the fact that although there is an ingredient in Liquid Cascade that could potentially cause harm if swallowed, the chances are very slim of such harm occurring because the product is emetic — that is, it will cause vomiting before a harmful amount can be swallowed. No other manufacturer of liquid dishwashing detergents offer this additional protection.
>
> **Option 2 -** Market the product with a child-resistant cap. Consumers find this inconvenient. However, it is worth causing some inconvenience to reduce the risk even further.
>
> **Option 3 -** Produce a product which contains no ingredients which would be harmful if ingested. Such a product would not be as effective in cleaning dishes and hence would probably not sell well. However, the product would be both safe and convenient to use.

# Packaging Decisions

## Answers to questions in the student activity

a. *4*

b. *2*

c. *1*

d. *3*

e. *5*

f. *2*

g. *5*

*Procter & Gamble chose the second option in marketing Liquid Cascade. Although the risk of harm was small, the product was packaged with a twist-and-turn child-resistant cap for an added margin of safety. Some consumers found the cap inconvenient, but in weighing the risks against the benefits of additional consumer acceptance, Procter & Gamble decided consumer safety was more important than convenience.*

# Safe Soap

Americans come in contact with soap and detergent products several hundred million times a day through personal bathing, laundering, dishwashing and any number of other household cleaning chores.

Consumers may think primarily of the safety of products in terms of how those products are used in the home. Manufacturers are concerned about:

**Safety to humans:**

- To the people who make the product
- To consumers who use the product
- To consumers who may accidentally misuse the product

**Safety to the environment as a result of product manufacture and use:**

- To sewage disposal systems
- To bodies of water
- To aquatic life (fish and plants)
- To animals

**Safety to material with which the product will come in contact:**

- Laundry appliances and their component parts
- The vast array of fibers, fabrics, dyes and finishes in the family wash

**Safety testing.** Detergents aren't supposed to be eaten, but children, especially toddlers, are great explorers and tasters and have been known to eat or drink a detergent. What happens to the child who does? Detergents aren't supposed to be rubbed in the eyes, but it can happen. Will the product be mild to the skin if used regularly?

Because consumer use of most detergents involves regular contact with the skin, manufacturers do skin testing with human volunteers. Finally, a new product is used in tests in homes with groups of homemakers. A dermatologist (doctor who specializes in problems of the skin) examines each person's hands before and after use.

**Environmental studies.** Biologists, chemists and sanitary engineers review new materials to be sure they are safe for the environment. Tests determine how the material is biodegraded and removed during wastewater treatment. New chemicals are tested to be sure they will not harm fish or other aquatic life such as insects or plants.

**Safety to materials.** The effects of the product on laundry appliances and on the materials used in their construction (porcelain, aluminum, stainless steel, plastics) are studied. Testing is done to ensure the product will not be damaging to fabrics and its effects of dyes, finishes, metals (such as those used in zippers), buttons and the like are carefully reviewed.

Only after all the tests have provided practical assurance of safety — and after extensive testing in the laboratory and by consumers has shown the product to be effective — is the product ready to be marketed.

STUDENT
ACTIVITY

# Partners in Product Safety

**Product: PAPER TOWEL FOR MICROWAVE COOKING**

**Product developer:** The developer would ask whether the product is safe for contact with food. Will the paper towel burn in the microwave? When Procter & Gamble developed Bounty Microwave towels, they first determined that all material requirements prescribed by FDA for products that come in contact with food were met. Then the towels were reviewed by a major university and found successful for use in microwave cooking. Fire safety was tested by outside consultants and inside the company as well. Procter & Gamble performed an extensive battery of tests by microwaving with representative food materials.

**Product: DISPOSABLE DIAPERS**

**Product developer:** The developer needs to determine safety for babies' skin. Procter & Gamble researched information about the safety of the materials used in Ultra Pampers. Scientists then conducted extensive laboratory tests with the material. Following laboratory tests, they conducted actual use tests. Several hundred babies used this product for many weeks. The babies were examined regularly. They included children who were known to have very sensitive skin. Product safety scientists also asked nationally recognized experts in areas such as pediatrics and nursing to review all of their safety data.

**Product: ANTI-DANDRUFF SHAMPOO**

**Product developer:** The developer needs to determine safety for people's scalp and hair. Will the shampoo burn the eyes? When Procter & Gamble developed the Head & Shoulders product, scientists ran more than fifty clinical studies. These tests studied potential effects such as eye irritancy and confirmed the product was safe for the scalp, skin and safe for the hair — also that it did not discolor the hair. The clinical studies involving people were conducted in many cities throughout the United States. Participants in the studies were identified as having dandruff. The clinical tests were performed over a six week period.

**Product: ORANGE JUICE FORTIFIED WITH CALCIUM**

**Product developer:** The developer needs to be sure the new product does not introduce new risks of medical problems to consumers. Although all the ingredients are safe and commonly used in other foods or beverages, calcium is not expected in orange juice, and purchasers and their families may not be aware it is there. To evaluate this, Procter & Gamble assembled two groups of scientists. First, a group of Procter & Gamble experts met and asked as many questions as they could about product safety to make sure all possible issues were covered. Then a group of non-Procter & Gamble medical and nutrition experts from all over the United States were brought together to review the plans, formulas and all the safety data. Only when this second group was satisfied that consumers were safe was the product, Citrus Hill Plus Calcium, marketed. In addition, Procter & Gamble scientists continue to review new information as it is published to ensure continuing safety of the product.

# Home Economics Glossary

| | |
|---|---|
| **Aesthetics** | Relating to beauty or attractive appearance. |
| **Corrosive chemical** | Substance capable of dissolving or wearing away gradually, especially by chemical action. |
| **EPA** | Environmental Protection Agency |
| **FDA** | Food and Drug Administration |
| **FHSA** | Federal Hazardous Substance Act |
| **Flammable chemical** | Substance that poses a fire hazard during routine handling. |
| **Hazardous chemical** | Substance that may cause substantial illness or injury to people or to the environment. |
| **PPPA** | Poison Prevention Packaging Act |
| **Reactive chemical** | Substance which tends to react spontaneously with air or water, is unstable to shock or heat, generates toxic gases or explodes. |
| **Recycle** | Technology which involves collection, separation, processing and reuse of products. |
| **Solid waste** | Everything which is produced, used and discarded in solid form. |
| **Syrup of ipecac** | Also known as Brazil Root, it is a substance which induces vomiting. |
| **Toxic** | Poisonous. A toxic substance is one which poses a substantial hazard to human health and may cause illness, injury or death. |
| **Toxicity** | The degree to which a substance is toxic or poisonous. |

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# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR ECONOMICS EDUCATORS

PROCTER & GAMBLE
EDUCATIONAL SERVICES

# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR ECONOMICS EDUCATORS

PROCTER & GAMBLE
EDUCATIONAL SERVICES

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We hope you find DECISIONS ABOUT PRODUCT SAFETY a useful and helpful addition to your classes.

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# Decisions About Product Safety

## Introduction

The Economics component to the complete unit entitled DECISIONS ABOUT PRODUCT SAFETY is designed to discuss the concept of marginal decision making as it relates to the question "how safe is safe?" Marginal decision making requires people to compare the added benefits and costs of a particular action before making a choice. Students will learn that individuals and business people must make difficult choices involving product safety which require weighing the possible additional costs and benefits obtained if a certain choice is made. Because the chance of experiencing the possible cost must be considered in making these types of decisions, they all involve risks and risk management.

Specifically, scarce resources and unlimited wants require people and organizations to make decisions. Making decisions requires a systematic weighing of the perceived benefits derived from the choice as compared with the costs. Costs should be viewed from an opportunity cost perspective (value of the next best alternative given up). Risk represents the possibility of bearing a cost now or in the future. Few if any activities are "risk free." Consequently, decisions in this area are mandatory.

Decisions are seldom an all or nothing circumstance. Many times decisions are broken down into incremental choices and a variety of good alternatives exist. Often one choice influences many other possible choices and the consequences of these choices have both short and long-term effects. Marginal decision making helps the decision maker in these circumstances. One must weigh the incremental benefit with the incremental cost now and in the future for a good economic decision to be made. When a person cleans his or her home, for example, the decision is not usually to clean or live in filth, but rather one of spending another hour of cleaning given what it will do to the cleanliness of the home compared with the enjoyment or benefit one can derive by doing something else during that hour. Having a perfectly clean house is virtually impossible, so the decision is one of degree of cleanliness. This process of incremental decision making is important in business decision making as well, including those decisions made in the area of product safety.

The Economics component is designed to be completed in four class periods with appropriate homework activities to be completed by the students. The material is designed to be flexible — you may choose to use only parts of the activities or to use them with activities from other sections of the unit.

**OVERVIEWS**

**Life and Death Decision.** Students record and evaluate the importance of their daily decisions. After listing the decisions they have made over a period of time, they determine the potential costs and benefits of their choices.

**Make It Right.** Students see how resource availability influences what and how products are made when they make a product using different resources. The decisions the students make related to the what and how questions, determine the product's safety and its impact on the environment.

**Suds and Safety.** Students see how important product safety issues are to business as they read a case study on soaps and detergents. They examine the testing procedures businesses use to make a safe product for normal use and potential misuse. Students identify the respective costs and the benefits of making a product safe.

**Garbage Decision Making.** Students discover that decisions often have long-term impacts and secondary effects as they devise their own solution to the solid waste problem in America. After researching and reading about the magnitude of the problem, students develop solutions to the problem and write position papers. Student groups evaluate the individual ideas and reach consensus on a solid waste plan.

# Life And Death Decision

## An Evaluation of Our Decisions

### Overview

Students record and evaluate the importance of their daily decisions to demonstrate the need for proper decision making. Often people make choices without systematically weighing the potential costs and benefits. Hence the consequences of basic decisions may be a surprise to the decision maker. Although making uninformed choices is in itself a decision, more knowledge about how to make decisions and the importance of one's decisions will optimize satisfaction.

Making decisions on the margin is an important skill. It requires people to look at the added benefits and costs derived from a decision. It forces people to look into the future and assess possible outcomes of different choices. It also suggests that decisions should be broken down into incremental choices. A decision to eat lunch, for example, is not a decision to have pie for dessert. Proper decision making suggests that a person determines the possible benefits and costs of eating pie after he or she has finished their main course. It is in this way that the greatest satisfaction will be generated.

### Time required

One class period

### Concepts covered in this lesson

Decision making
Costs and Benefits
Risks
Marginalism
Resources
Opportunity Cost
Scarcity
Environment
Pollution (Externalities)

### Objectives

Students who participate in this activity should be able to:

1. Understand that good decisions regarding safety utilize the cost and benefit or risk management technique.

2. Employ the marginal decision making process in their own lives and evaluate the decisions of others based upon a comparison of the marginal social benefit with the marginal social cost.

3. Understand that good decisions recognize risks now and in the future as possible costs.

### Materials

DECISION DIARY activity sheet for each student

### Teaching strategies

The activities in this Economics component build on the ideas presented in the Core material. Specifically, the decision making process is expanded by adding marginal thinking to the procedure. This allows students to see, both in their own lives and in reviewing the decisions of business, that added costs and benefits are important to consider as well as potential risks. Teachers may wish to refer to the Core experiences often as they involve their students in these activities. Related activities on risk are included in the Science section of the unit.

1. Begin the activity with the question "What life and death decisions have you made so far today?" This question will demonstrate that important decisions about safety are made daily. The students may suggest crossing the street, driving a car, riding in a car, taking a shower or using the electric toaster or hair dryer. After the students have described two or three decisions that have life threatening possibilities, suggest that the activity sheet, DECISION DIARY, will help them identify and see the importance of their many decisions.

2. Distribute a DECISION DIARY activity sheet to each student. Although at this stage of the lesson there are few right answers to the questions on the activity sheet, the teacher can expect the students to be very cautious about identifying many activities as being potentially unsafe. This is caused by young peoples' perception that they are invulnerable and, perhaps more importantly, it may be that they would prefer not to realize their choices are so important.

Direct students to complete the questions and be prepared to discuss them as a class.

3. Discuss the DECISION DIARY activity sheet. Compare the decisions of the students and generalize about the decisions people make and the process used in making decisions. Emphasize the weighing of added costs and benefits and risk assessment in decision making. Have the students note that many of their choices do not involve right or wrong answers, but instead require a calculation of the relative merit of each possible alternative.

To demonstrate this, review the decisions and the alternatives people have every morning as their alarm goes off. List the costs and benefits of each possible alternative as one goes through the steps of awakening, deciding to turn on the light or stay in the dark, choosing to have good hygiene, selecting what to wear, deciding what to eat for breakfast, choosing a way to get to work or school, deciding to kiss spouse or parents good-bye, choosing whom to talk with, deciding whether to enter work or school, etc.

STUDENT
ACTIVITY

# Decision Diary

## Activity Sheet

Name ______________________________ Date ______________

**Purpose**

To identify the number and importance of the decisions you have made lately.
To practice making decisions.

**Directions**

Complete the following questions as accurately as possible.

1. Complete the statement: "I am concerned about my safety and the safety of others because.......

2. Check the appropriate box:

| | YES | NO |
|---|---|---|
| **TODAY** | | |
| I brushed my teeth | ☐ | ☐ |
| I checked my tires before driving | ☐ | ☐ |
| I used a ground fault outlet for my hair dryer or curling iron | ☐ | ☐ |
| I fastened my seat belt | ☐ | ☐ |
| I looked both ways when crossing the street | ☐ | ☐ |
| I hired a bodyguard | ☐ | ☐ |
| I read the label on the mouthwash | ☐ | ☐ |
| I picked a fight with a person twice my size | ☐ | ☐ |
| I smoked a cigarette | ☐ | ☐ |
| I rode a bicycle or motorcycle without a helmet | ☐ | ☐ |
| I wore a hat and clothing which would protect my skin from the sun | ☐ | ☐ |

3. The following activities are generally considered to be safe activities. Identify (if you can) when these activities may be hazardous to your health.

   Eating

   Jogging

   Taking a walk

   Dancing

   Sleeping

   Driving a car

   Riding a bicycle

   Kissing

4. List five decisions you have made in the last week that have had benefits and costs.

# Make It Right

## A Production Simulation

### Overview

Students see how resource availability influences what and how products are made when they create a product with different resources. The decisions the students make related to the what and how questions determine the product's safety and its impact on the environment.

With a limited number of resources, students working in groups are asked to produce something that flies, has visual appeal, is safe, has consumer appeal and is disposed of easily. This will place students in the role of a producer. A variety of decisions must be made with costs and benefits associated with each one. Priorities will be established to help the groups choose.

### Time required

One class period

### Concepts covered in this lesson

Decision making
Costs and Benefits
Risks
Marginalism
Resources
Opportunity Cost
Scarcity
Environment
Pollution (Externalites)

### Objectives

Students who participate in this activity should be able to:

1. Realize all production, including product safety, requires resources.
2. Understand that good decisions regarding product safety utilize the cost benefit or risk management technique.
3. Realize that the concept of product safety includes safety to humans, animals and the general environment now and in the future.
4. Understand production goals have relative merit and must be prioritized before good decisions can be made.

### Materials

per student groups of 3-5:
five sheets of 8 1/2 x 11 inch white paper
three medium paper clips
a pencil
a ruler
two brass fasteners

### Teaching strategies

Production, resource scarcity, varying levels of knowledge and effort, and the ability to use prioritized goals in making decisions are important elements in this lesson. Students practice making and supporting their choices in groups and with the total class. In addition, students realize production decisions change as priorities and relative resource scarcity change.

1. Divide the class into groups of 3-5. Inform the groups their task is to produce either a new product or a modification of an old product from the resources provided. The product must fly, be durable, appealing to consumers, attractive, safe for humans and the environment and be able to be disposed of easily after use.

List the following criteria on the chalkboard:

(1) represents the lowest score and (5) the highest.

Visual appeal: (1) (2) (3) (4) (5)

Functionality (does it fly?): (1) (2) (3) (4) (5)

Time aloft: (1) (2) (3) (4) (5)

Purchase potential: (1) (2) (3) (4) (5)

Safety: (1) (2) (3) (4) (5)

Durability: (1) (2) (3) (4) (5)

Environmental safety: (1) (2) (3) (4) (5)

Disposal: (1) (2) (3) (4) (5)

Suggest to the student producers that these criteria will be used to judge their products. After production the total class will rank each group's product. Ask if some criteria should be more important than others. If so, these may be assigned higher values. (For example, if functionality is more important, the values may be increased to 2-6 or 3-7 and so on.) Their goal is to determine what criteria are the most important and maximize their potential score.

2. Provide each group with five sheets of 8 1/2 x 11 inch white paper, three medium size paper clips, a pencil, a ruler and a brass fastener. The group's task is to produce a product that most closely adheres to the criteria listed on the chalkboard. They have fifteen minutes to accomplish the task.

3. After production is completed, provide each group with the opportunity to demonstrate its invention to the class. Ask the rest of the class to evaluate the new product based upon the criteria listed. Record the scores for each criteria and product on the chalkboard. Note that one consensus score from the total class is recommended. Select a winner based upon the highest score.

4. Repeat the production process, but this time allow the groups to use additional resources they have on their person or in their desks. This situation will likely mean some groups will have an abundance of resources and others will not.

Repeat the evaluation and scoring procedure for the new products using the criteria listed earlier. Discuss the differences in products when the resource base was expanded.

5. Discuss using the following questions:

   A. How does resource availability influence production?

      *Resources limit the types of products that can be made.*

   B. Do product and environmental safety concerns influence production decisions?

      *Certain products cannot be made safe enough to be produced. Resources are consumed making products safe for the consumer and the environment.*

   C. Is the product(s) you produced perfectly safe?

      *No product is 100% safe for every circumstance. Ingestion of paper may cause choking, paper cuts may occur, the paper clip or brass fastener may puncture the skin or harm the eyes.*

   D. How does ranking the criteria help in decision making?

      *When choices must be made, establishing the relative importance of the items to be considered helps improve the decision makers' chances of making a choice which maximizes benefits and minimizes costs.*

# Suds And Safety

## A Soap and Detergent Case Study

### Overview

Students realize how important product safety issues are to business as they read a case study on soaps and detergents. They examine the testing procedures businesses use to make a safe product for normal use and misuse. Students identify the respective costs and benefits of making a product safe.

Developing safe products is very important for business decision makers. They realize a company can "lose it all" by placing an unsafe product on the market. Consequently, safety is an issue that receives a great deal of attention. Unfortunately, developing a completely safe product is virtually impossible and the cost of safety is often high. When, for example, is it a good decision to add more to the safety of a product and when isn't it? The answer is when the calculated additional benefits outweigh the calculated additional costs it is a good decision to add to the safety. If the reverse is true and the costs outweigh the benefits, the appropriate decision is not to add more to the safety. Reliable information is needed to make these decisions as well as an understanding of the company's long-term goals for success.

### Time required

One class period

### Concepts covered in this lesson

Costs and Benefits
Decision making
Risks
Marginalism
Opportunity Cost
Environment
Pollution (Externalities)

### Objectives

Students who participate in this activity should be able to:

1. Understand good decisions regarding product safety utilize the cost and benefit or risk management technique.

2. Employ the marginal decision making process in their own lives and evaluate the decisions of others based upon a comparison of the marginal social benefit with the marginal social cost.

3. Understand that decisions recognize risk now and in the future as possible costs.

4. Realize the concept of product safety includes safety to humans, animals and the general environment now and in the future.

### Materials

A SUDS case study for each student

### Teaching strategies

The SUDS case study review helps students become aware of the importance and complexity of the safety issue. It demonstrates that safety goes beyond concerns for humans in the short run and, in fact, pertains to the long run protection of the environment and consequently all living things now and in the future.

1. Ask the students "How many times have you come in contact with soap or detergent today, this week?" Suggest that because of the large number of contacts and the amount used, decisions regarding the development, production and use of soaps and detergents are very important for our safety and the safety of the environment.

Distribute a copy of the case study, SUDS, to every member of the class. Direct them to read it carefully and on a separate sheet of paper answer the questions asked of them. Inform the students that a discussion will follow their reading using the questions found in the case study.

2. Discuss the case study using the questions integrated into the case. Stress the need for solid information before good decisions can be made. Review the marginal decision making method by using the information found in the case study. Specifically, address the decisions to conduct more testing (animal and computer modeling) and potential misuse situations on existing soaps and detergents.

# Suds

## Suggested answers to questions in the case study

1. **LIST THE ITEMS YOU HAVE AT HOME WHICH CONTAIN SOAP OR DETERGENT.**

   *Students should list such items as hand soap, laundry detergent, shampoo, floor cleaner, dishwashing detergent, etc.*

2. **WHAT MIGHT HAPPEN TO THE USER, THE BUSINESS AND THE ENVIRONMENT IF A COMPANY PRODUCES A PRODUCT THAT WAS NOT SAFE BOTH IN THE SHORT AND THE LONG-TERM?**

   *An unsafe product could result in an injury or an adverse health effect. An unsafe product would undermine consumer confidence in the brand and the company in general. Sales would fall as would profits in the short-term. In the long-term the company would have to change the product and incur high costs in liability suits and in attempts to rebuild consumer loyalty. A product which was unsafe for the environment might have an effect on the water supply, wildlife, air quality, etc.*

3. **WHAT ARE THE COSTS AND BENEFITS TO THE COMPANY OF HIRING PRODUCT SAFETY PROFESSIONALS?**

   *The costs incurred are labor and equipment costs which could have been used in another type of production activity. The benefits are in the reduction of the chances of producing an unsafe product, hurting people, damaging the environment and reducing business.*

4. **WHEN WOULD YOU RECOMMEND USING ANIMALS FOR TESTING?**

   *Answers will vary. When the benefits outweigh the costs. When federal regulations require such tests. When no other testing procedure can provide the level of information needed to make a good decision on the product's safety. Some students may feel animals should never be used for testing.*

5. **DO YOU CONSIDER PRODUCT SAFETY IMPORTANT? DISCUSS IF THE COSTS ARE WORTH IT.**

   *The students are being asked for their opinion. The question needs to be evaluated based upon the concept of cost and benefit.*

STUDENT
BACKGROUND
READING AND
ACTIVITY

# Suds

## A Soap and Detergent Case Study

### Purpose

To describe the number and complexity of decisions made to produce soaps and detergents.

### Directions

Answer the questions found in the case study on a separate sheet of paper.

Often we take for granted the activities and products we are involved with every day. They become so commonplace we forget to think about them. Such is the case with soap and detergent. We will all agree soaps and detergents are important. We bath, wash our hair, launder our clothes, clean our dishes and most of our material goods with them. Truly, without "suds" our world would be a dirty place.

**LIST THE ITEMS YOU HAVE AT HOME WHICH CONTAIN SOAP OR DETERGENT.**

It is estimated that all Americans come in contact with soaps and detergents, directly or indirectly, several million times a day. With this level of exposure, it's no wonder the producers of soaps and detergents are very concerned about the safety of their products. The safety issue is addressed early and often. At every stage of production, marketing and usage, the products are subjected to safety evaluations. Decisions regarding what ingredients to use, what directions and cautions to put on the package and how to dispose of the package properly are some of the issues requiring decisions.

**WHAT MIGHT HAPPEN TO THE USER, THE BUSINESS AND THE ENVIRONMENT IF A COMPANY PRODUCED A PRODUCT THAT WAS NOT SAFE BOTH IN THE SHORT AND THE LONG-TERM?**

To producers safe means safe to humans, safe to the environment and safe to materials with which the product will come into contact. This seems like a long list, but it's only the beginning. The following lists the specific groups influenced by safety decisions:

**Safety to humans:**

- The people who make the product
- The consumers who use the product
- The consumers who misuse the product, accidentally or intentionally
- The consumers who come in contact with the product after use or disposal

**Safety to the environment as a result of manufacture, use and disposal:**

- To sewage disposal systems
- To bodies of water
- To aquatic fish and plants
- To food crops
- To animals

**Safety to materials with which the product comes in contact**:

- Laundry appliances
- Fibers, fabrics, dyes, plastics and finishes

In every stage of the development cycle the safety concerns for all of these areas must take place. This includes the product's design, the factor input decisions, the method of production choices, selecting a package, writing directions for use and suggesting proper disposal.

The Procter & Gamble Company employs over 500 people who are directly involved in product safety issues. Because the company is very safety conscious, many more people are indirectly involved in the process.

**WHAT ARE THE COSTS AND BENEFITS TO THE COMPANY OF HIRING PRODUCT SAFETY PROFESSIONALS?**

Specifically, the testing program employed by companies like Procter &

Gamble includes the product's effects on human beings caused by:

- Exposure to products or their ingredients resulting from regular use
- Known possibilities of accidental misuse

Tests of this kind often require the use of computer modeling and when necessary animal tests. Although companies are attempting to reduce animal tests, sometimes such tests are required by regulatory agencies or are the best or only way to make sure the product is safe. Government leaders and scientists agree that it is not possible today to provide adequate safety and efficacy assurance without animal research. Procter & Gamble, for example, uses animal testing primarily for the development of regulated food and drug products, and has reduced its use of animals in testing of household and personal care products over 80% in the last five years. The company is a recognized leader in the ongoing search for alternative test methods.

**WHEN WOULD YOU RECOMMEND USING ANIMALS FOR TESTING?**

Finally, tests take place under the actual conditions the product would be used in the home. People are selected and their use of the product is monitored so the effects of long-term use of the "SUDS" in the real home environment can be evaluated.

**DO YOU CONSIDER PRODUCT SAFETY IMPORTANT? REVIEW THE DECISIONS BUSINESSES MAKE TO MAKE "SUDS" SAFE. DISCUSS IF THE COSTS ARE WORTH IT. SUPPORT YOUR OPINION.**

# Garbage Decision Making

## An Analysis of Data

### Overview

Students discover that decisions often have long-term impacts and secondary effects as they devise their own solution to the solid waste problem in America. After researching and reading about the magnitude of the problem, students develop a solution to the problem and write a position paper. Student groups evaluate the individual ideas and reach consensus on a solid waste plan.

The decisions people make have consequences or secondary effects often called externalities. Consumers' decisions to consume and producers' decisions to package products in certain ways generate solid waste which impacts not only the consumer and business, but also the rest of society. The proper safe disposal of solid waste is becoming a major societal concern because many of our landfills are closing, and others no longer meet the more substantial environmental restrictions. In addition, the cost of developing new environmentally safe landfills has skyrocketed.

### Time required

Two class periods

### Concepts covered in this lesson

Costs and Benefits
Decision making
Environment
Marginalism
Opportunity Cost
Pollution (Externalities)
Resources

### Objectives

Students who participate in this activity should be able to:

1. Understand good decisions regarding environmental safety utilize the cost and benefit or risk management technique.

2. Employ the marginal decision making process in their own lives and evaluate the decisions of others based upon a comparison of the marginal social benefit with the marginal social cost.

3. Realize the concept of product safety includes safety to humans, animals and the general environment now and in the future.

### Materials

FACTS ABOUT SOLID WASTE fact sheet for each student.

### Teaching strategies

The activities in this Economics component provide the students with the opportunity to research and review data on solid waste. It demonstrates that a problem exists, it varies in magnitude worldwide and it has possible solutions. Students develop their own position on the subject, write a paper and, as a group, reach a consensus solution. Related activities on this subject are included in "Environmental Safety" in the Science section and "Consumer and Business : Partners in Product Safety" in the Home Economics section of the unit.

1. Introduce this lesson by writing "NIMBY" on the chalkboard. Ask the students if anyone knows what these letters mean? Have them guess if nobody has the answer. Following the answer or the students' guessing, write "not-in-my-back-yard" on the chalkboard. Ask the students what this means and what has caused this attitude to develop.

The "NIMBY" concept has become prevalent in the last few years in regards to waste disposal. Although most people see the need for having proper waste disposal facilities, few people want the facility "in-their-back-yard" or community. The attitude of "let someone else bear the cost of my garbage" coupled with high development costs is keeping proper facilities from being built. The problem is reaching critical proportions. People are worried about literally being buried in their own solid waste.

2. The topic of solid waste is current and considered critically important by individuals, businesses, environmental groups and governmental officials. Consequently, many references to the issue can be found in the media, in speeches and in periodicals.

Place the title **GARBAGE** on the bulletin board. Under the main title add the subtitles **Student, Domestic** and **International.** Assign each student the task of finding an article, picture or item that adds to his or her understanding of the solid waste problem and have them bring it to class for discussion and placement on an "instant bulletin board." Before the students can place their item on the bulletin board, they must summarize its content to the class and decide with the class under which subtitle it best fits. Upon completion of this task, ask the students to place the item on the bulletin board.

Articles on radioactive waste, garbage barges, rising "tipping fees" (i.e., fees charges for trash removal) and ground water contamination (to name a few) are excellent topics for the bulletin board display.

3. It is very possible the "Instant Bulletin Board" activity described filled the spaces under the subtitles **Domestic** and **International**, but the **Student** subtitle may lack adequate material. To correct this deficiency, draw a garbage can on the bulletin board under the **Student** subtitle. Split the garbage can picture in half by drawing a vertical line down the middle. Label one half Volume and the other Weight.

Assign the students the task of measuring the garbage their family has produced in one day. It may help to facilitate this activity to let students know a few days in advance what will be required. Suggest they provide an empty container for their family to use for disposing of all their trash and garbage that day. Calculate the volume in cubic inches (length x height x width). After the volume has been determined, ask the students to weigh the garbage. Both of these numbers MUST be returned to class the next day. Add the volume and weight numbers together and place on the bulletin board under the appropriate sections in the garbage can.

Discuss the differences and similarities between the solid waste totals brought in by the students. Why do some families have a lot of garbage and others do not? Convenience foods, participation in recycling efforts, family life-style, trash compactors, size of family and age of family will help answer the questions.

4. Distribute a copy of the student reading, FACTS ABOUT SOLID WASTE, to each student. Their assignment after reading the fact sheet is to write a one page position paper suggesting a solution to the solid waste problem. Explain that a position paper is a report which recommends a course of action on a particular issue. Tell the students to be sure to create an incentive system which will help people decide to follow their suggested solution. For example, if recycling is the suggestion, proper rewards must be given to both the individual and business to use recycled materials.

The position papers will be evaluated using the following criteria:

- Demonstrated understanding of the problem.
- Proper incentives for action.
- Long-term versus a short-term view.
- An understanding of cost and benefit decision making.
- Effectiveness of the plan.
- Is the plan safe for humans, animals and the environment?

5. Divide the class into groups of six. Ask each group member to read his or her position paper to the group. Discuss the papers using the criteria described above in an attempt to identify the solution(s) to the problem of solid waste and a safe environment. This assignment should cause a great deal of conflict and confusion because a single solution or a complete eradication of solid waste is not feasible. The proper procedure weighs the social costs and the social benefits of every suggested solution and selects the alternative which provides the greatest good at the lowest cost.

6. After the groups have had time to discuss, argue and reach some level of agreement, bring them back together as a total class. Discuss as a class a comprehensive program for solid waste that may be acceptable to most people. Include:

A. Source reduction
B. Recycling and composting
C. Incineration
D. Secure landfills

7. Once a program has been identified, ask "Does this program eliminate solid waste?" The answer will be no. The program represents a decision to have an acceptable level of waste at safe limits given certain costs now and in the future.

STUDENT
BACKGROUND
READING AND
ACTIVITY

# Solid Waste Fact Sheet

## An Analysis of Data

**Purpose**

To acquire more knowledge about solid waste and use the information to develop a solid waste plan.

**Directions**

Read the information carefully. Complete the activities and answer the questions found in the reading.

Garbage is rapidly becoming the topic of discussion in business meetings, political conventions and even at the dinner table. Americans now place adequate garbage disposal third on a list of major local problems. No wonder, when every person in the United States produces 3.5 pounds of garbage per day. That's 160 million tons per year, enough to fill 2,700 football fields with a layer of garbage ten stories high! Although estimates vary, all researchers agree that solid waste totals are growing and they are estimated to grow more.

**MONITOR THE SOLID WASTE YOU GENERATE IN ONE DAY. KEEP A RECORD OF THE ITEMS YOU THROW IN THE GARBAGE AT HOME, AT SCHOOL AND AT RESTAURANTS. RECORD YOUR FINDINGS AND BE PREPARED TO SHARE YOUR FINDINGS IN GROUP AND CLASS DISCUSSIONS.**

It is estimated that packaging and container waste makes up 30% of our discards, another 25% is nondurables such as newspapers and old clothing. Twenty per cent is yard waste, 14% is durable goods such as appliances and tires and 9% is food waste. The remaining 2% is miscellaneous inorganic wastes. The production of safe products requires products to be adequately packaged, but decisions must be made in the solid waste area that will protect the total environment for the protection of all living things. To better understand our garbage, review the chart which follows:

### WHAT'S IN OUR GARBAGE?

| Amount (1986 data) | Millions of tons | % |
|---|---|---|
| Paper and paperboard | 64.7 | 41.0 |
| Glass | 12.9 | 8.2 |
| Metals | 13.7 | 8.7 |
| Plastics | 10.3 | 6.5 |
| Rubber and leather | 4.0 | 2.5 |
| Textiles | 2.8 | 1.8 |
| Wood | 5.8 | 3.7 |
| Food wastes | 12.5 | 7.9 |
| Yard wastes | 28.3 | 17.9 |
| Other | 2.7 | 1.7 |
| Total | 157.7 | 100.0 |

Source: Characterization of Municipal Solid Waste in the United States, 1960 to 2000; Franklin Associates, Ltd., 1988.

STUDENT
BACKGROUND
READING AND
ACTIVITY

## HOW DOES YOUR GARBAGE COMPARE WITH THE NATIONAL AVERAGE?

The problem of dealing with our solid waste must be addressed and rapidly. Fewer and fewer solid waste facilities exist to store an ever growing amount of material. Like so many societal problems, waste disposal seems at first glance to be too large to have a solution. This is simply not true. Decisions can be made to solve the problem or at least to reduce its negative effects. To help you begin to realize the problem may have a solution, review the following chart:

### GARBAGE AROUND THE WORLD

Per capita lbs/day

| | |
|---|---|
| Los Angeles | 6.4 |
| Philadelphia | 5.8 |
| Chicago | 5.0 |
| New York | 4.0 |
| Tokyo | 3.0 |
| Paris | 2.4 |
| Toronto | 2.4 |
| Hamburg (W.Germany) | 1.9 |
| Rome | 1.5 |

Source: National Solid Wastes Management Association, 1989.

**DOES EVERY CITY AROUND THE WORLD HAVE THE SAME LEVEL OF SOLID WASTE GENERATION? WHY DO YOU THINK LOS ANGELES HAS SO MUCH MORE THAN ROME? HOW DOES YOUR FAMILY COMPARE WITH THE CITIES LISTED?**

Currently, our nation deposits 83% of its solid waste in landfills, 11% is recycled and 6% is burned to generate energy.

**FIND OUT WHERE YOUR COMMUNITY DUMPS ITS SOLID WASTE.
DOES YOUR COMMUNITY HAVE A WASTE-TO-ENERGY FACILITY?
WHERE IS YOUR NEAREST RECYCLING CENTER?**

Landfills will not continue to be a viable solution for the bulk of our solid waste. Of the 6000 landfills operating in this country in 1988, 200 will close by 1993 causing an overall capacity loss of 56 million tons. This relative shortage of landfill space is causing the price charged to dump (tipping fees) to rise. Review the following chart to determine the tipping fee in your area:

## TIPPING FEES BY SELECTED STATES

| | $/TON | | $/TON |
|---|---|---|---|
| Alabama | $ 10.75 | Minnesota | $ 40.06 |
| Arkansas | 6.75 | Missouri | 13.00 |
| California | 10.00 | Nebraska | 8.00 |
| Colorado | 10.50 | Nevada | 6.00 |
| Connecticut | 35.00 | New Jersey | 41.97 |
| Delaware | 24.82 | New York | 40.00 |
| District of Columbia | 14.00 | North Dakota | 9.00 |
| Florida | 27.40 | Ohio | 15.51 |
| Georgia | 13.50 | Oklahoma | 12.75 |
| Hawaii | 13.00 | Pennsylvania | 25.00 |
| Illinois | 14.70 | Rhode Island | 49.00 |
| Indiana | 15.15 | South Carolina | 4.75 |
| Kansas | 4.07 | Tennessee | 7.50 |
| Louisiana | 9.75 | Texas | 9.35 |
| Maryland | 40.00 | Virginia | 24.00 |
| Massachusetts | 65.00 | Washington | 42.00 |
| Michigan | 26.00 | Wisconsin | 14.25 |

Source: National Solid Wastes Management Association, 1988.

**WHY DO YOU THINK THE TIPPING FEES VARY SO MUCH BY STATE? WHAT IS THE TIPPING FEE IN YOUR AREA?**

New landfills are difficult to start because of the "NIMBY" situation and environmental concerns. And, it is estimated that an environmentally safe landfill will cost 89 million dollars for a 100 acre facility. This price includes special holding basins, leaching fields and the cost of returning the area to a pleasant and safe place for humans and animals.

**GIVEN THE COST ESTIMATES AND YOUR KNOWLEDGE OF ECONOMICS, WHAT MUST HAPPEN FOR BUSINESSES TO BUILD NEW LANDFILLS?**

Before our discussion continues, one issue must be addressed. It is that of litter. Many people think the litter problem and the solid waste problem are the same. For the most part, they are not. Litter is the careless or incorrect disposal of wrappers, soft drink cans, convenience food containers, etc.. The act of littering forces other people to bear the cost of an unsightly environment, annoying insects and hiring someone to pick up the litter. Solutions to this problem may be consistent with the solid waste solutions, but it is naive to think solving the litter issue will solve the solid waste problem.

**DID YOU SEE LITTER ON YOUR WAY TO SCHOOL TODAY? DID YOU LITTER? IF SO, WHY DID YOU CHOOSE TO, AND IF NOT, WHY WAS THAT DECISION MADE?**

One solution that has been suggested to the litter issue is the creation of degradable packages, that is, packages made from material which will break down into simpler materials through exposure to natural forces such as bacteria or light.

Because litter is often exposed to the elements, using degradable packaging sounds like a useful solution. However, degradable packaging will not help the solid waste problem because landfills protect the garbage from the very elements that foster decomposition by covering it with layers of soil. In other words, whether a material is biodegradable or not, when it's put in a landfill not much biodegradation occurs. It should be noted too, that businesses have to consider more than the litter and solid waste issues when designing packages. Durability, freshness and safety must be considered as well.

**WHY DOESN'T CREATING DEGRADABLE PACKAGES HELP THE SOLID WASTE PROBLEM?**

The solid waste problem does not have an easy or single solution. Currently, comprehensive waste management plans include source reduction, recycling and composting, waste-to-energy incineration and environmentally safe landfills.

Source reduction refers to changing both product and packaging to reduce the weight and volume of solid waste. Procter & Gamble, for example, created their new Pampers and Luvs disposable diapers with an absorbent gel core which reduced their volume by 50 percent. Similarly, package volume was reduced by 80% by replacing cardboard cartons with plastic poly-bags. The company's decision makers realize the solid waste problem is real, and are committed to reducing and better disposing of solid waste. Successful companies of the future will be those which meet consumers' demand for "environmentally smart" products and packages. This is why many companies are currently researching new and better ways to produce and package their products.

**WHY ARE COMPANIES CONCERNED ABOUT THE SOLID WASTE PROBLEM? WHAT OTHER ISSUES MUST COMPANIES BE CONCERNED ABOUT WHEN DEVELOPING A NEW PRODUCT OR MODIFYING AN OLD ONE?**

Recycling plays an important role in solving the solid waste problem. Review the following chart:

## RECYCLING

| | **Amount Generated (mill. of tons)** | **Amount Recycled (mill. of tons)** | **% of Total waste Recycled** |
|---|---|---|---|
| Paper and paperboard | 64.7 | 14.6 | 9.2 |
| Glass | 12.9 | 1.1 | 0.7 |
| Metals | 13.7 | 1.0 | 0.6 |
| Plastics | 10.3 | 0.1 | 0.1 |
| Rubber and leather | 4.0 | 0.1 | 0.1 |
| Textiles | 2.8 | 0.0 | 0.0 |
| Wood | 5.8 | 0.0 | 0.0 |
| Food wastes | 12.5 | 0.0 | 0.0 |
| Yard wastes | 28.3 | 0.0 | 0.0 |
| Other | 2.7 | 0.0 | 0.0 |
| Total | 157.7 | 16.9 | 10.7 |

Source: Characterization of Municipal Solid Waste in the United States, 1960 to 2000;
Franklin Associates, Ltd., 1988.

Essentially all reclaimable materials can be recycled. Technologies exist to process paper, glass, most metals and all types of plastics into useful new products. The economic advantages are obvious — new products and new markets, plus, materials that are recycled don't end up in the waste stream, thus reducing the burden to landfills and the resulting expense.

## WHAT INDIVIDUAL, COMMUNITY AND BUSINESS INCENTIVES ARE NECESSARY FOR A RECYCLING PLAN TO GROW AND BE SUCCESSFUL?

It is estimated that by the year 2000 17% of our solid waste will be burned to generate energy. This is an 11% increase from the waste-to-energy incineration currently being done. Although according to the Environmental Protection Agency, a waste-to-energy system should be considered as a preferred alternative to landfills, there are some concerns with this method of disposing of solid waste. One concern is air pollution. The generation of pollutants and their release into the air is now being effectively reduced or prevented by the air pollution devices built into modern day waste-to-energy facilities. Another concern is disposal of ash which is left with toxins that don't burn. When these ashes are buried, special care must be taken to prevent toxins from leaching into groundwater.

## WHERE IS THE BEST PLACE TO LOCATE A GARBAGE WASTE-TO-ENERGY FACILITY?

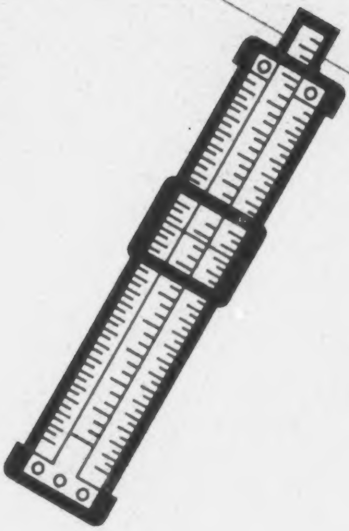
Deciding what should be done to solve the solid waste problem requires a set of complex decisions which require assessing risks and weighing costs and benefits for society, the community and the individual now and in the future.

## DESIGN A SOLID WASTE MANAGEMENT PLAN FOR YOUR COMMUNITY.

# Economics Glossary

| | |
|---|---|
| **Costs and Benefits** | A process of decision making in which people select alternative(s) that maximize their satisfaction and/or minimize their unhappiness. |
| **Decision making** | The process of reaching a conclusion after consideration and acting upon that conclusion. |
| **Environment** | All external factors influencing the quality of life. |
| **Marginalism** | The process of decision making in which a comparison of added benefits and costs determine the course of action or decision. |
| **Opportunity Cost** | The value of the benefit given up by choosing one alternative rather than another. |
| **Pollution (Externalities)** | The act of contaminating the environment which imposes negative effects on uninvolved third parties. |
| **Risks** | The chance of loss due to a particular event or decision. |
| **Scarcity** | The problem created by the limited availability of resources to produce goods and services and the unlimited desires for those goods and services. |

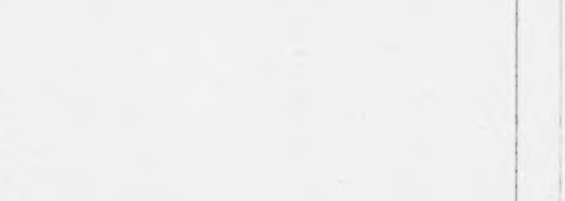
printed on recycled paper



# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR SCIENCE EDUCATORS

PROCTER & GAMBLE
EDUCATIONAL SERVICES



# DECISIONS ABOUT PRODUCT SAFETY

## A TEACHING UNIT FOR SCIENCE EDUCATORS

PROCTER & GAMBLE
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We hope you find DECISIONS ABOUT PRODUCT SAFETY a useful and helpful addition to your classes.

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# Decisions About Product Safety

## Overview

The Science component consists of activities to help students understand the role of science in providing key information that can be used by various individuals to make product safety decisions. The materials are designed to be used in general science courses in grades 8-12 and feature laboratory investigations, simulations, case histories and directed readings. Little specialized science equipment is needed for the activities. About 6-8 days are required for completion.

### OVERVIEWS

**Tartar Control Crest: A Case Study in Consumer Product Safety.** Students read a case study of the development, testing and marketing of Tartar Control Crest. Students learn that tartar is a chemical precipitate and investigate the chemical conditions under which selected precipitates may form.

**Risk.** Students investigate basic concepts of risk comparison as they examine a selection of activities that carry a probability of death of one in one million. Students then examine their own knowledge and beliefs about risk as they rank order a list of 15 other activities with regard to the risks associated with each activity. As they compare their estimates to the actual data and discuss their answers, students realize all activities have associated risks and that risks can be estimated mathematically and compared.

**Toxicity.** Students taste toothpaste or other consumer products to establish their taste threshold for the product. Students discover the human body reacts to different chemical substances in different ways and that thresholds of various substances vary widely. Students then calculate the amount of toothpaste they will swallow in a lifetime of brushing. This calculation leads to an investigation of toxicity in which the effects of dose, route of exposure, intrinsic toxic potential, and duration and frequency of exposure are discussed.

**Environmental safety.** Students use paper chromatography as a simulation of laboratory techniques used to identify and monitor product residues in the environment, and study the effect of dilutions of various consumer products on the growth of algal cultures. Issues in environmental safety, especially the difficulty of developing accurate, predictive models are discussed.

### SCIENCE OBJECTIVES

1. Science can and does provide key information for various individuals to use as they make decisions regarding safety of consumer products.

2. Product safety determinations require the use of existing science knowledge and, when appropriate, new experimentation so that human safety is not compromised.

3. All activities in life have associated risks. The risks of individual activities to humans can be computed and estimated in a process known as risk analysis.

4. Risk management is a complex process, a uniquely human activity involving making decisions or judgments on what risks to take using information from a variety of sources.

5. Toxicity determinations involve judgments of a complex interaction of a number of chemical and biological factors. These factors include the concentration or dose, duration and frequency of exposure, route of entry and intrinsic toxicity of the substance. Only when all factors are considered can a meaningful determination be made.

6. The impact of consumer products on the environment must be considered to arrive at an overall picture of product safety. Assessing this impact involves analyzing data from many diverse sources.

# Tartar Control Crest

## A Case Study in Consumer Product Safety

## Overview

Students read a case study of the development, testing and marketing of Tartar Control Crest to appreciate the role of science in various phases of the process. Science content includes a discussion of precipitation as the mechanism by which tartar is formed, and the role of surfactants, pyrophosphates and chelating agents in the cleaning process and in retarding tartar formation.

The role of science in providing essential safety information is highlighted. An account of early clinical trials of the product is provided to emphasize the importance of a carefully planned, scientifically controlled study in product testing.

## Time required

Two class periods for activities and discussion

## Science concepts covered in this unit

chelation
precipitation
chemical reaction
surfactants
tooth decay (tartar, gingivitis)

## Objectives

Students completing the activity should be able to:

1. Give examples that illustrate the role of science in various phases of product development, including issues of product safety.
2. Describe how tartar is formed and how the chemical formulation of Tartar Control Crest inhibits that process.
3. Describe the role of the clinical study in the effectiveness of a new product or formulation.

## Advance preparation

Duplicate sufficient copies of the student activity sheets and the student reading. Instruct the students not to mark on copies of the student reading if you plan to reuse it with other students. Make sure necessary equipment and materials for the student lab activity are arranged for efficient distribution to the students. Follow all storage and handling instructions for chemicals. To prepare a 0.1 M solution (approximately) of copper sulfate, dilute 6.25 grams copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$) with enough water to make 250 ml of solution.

## Teaching strategies

1. The student reading, TARTAR CONTROL CREST, (to be done first) provides a case study of how science can and does provide essential information used to make business decisions. This information may relate to product safety, effectiveness, feasibility and other factors. You may wish to read the story aloud in class or have students read and answer questions individually or in groups. Point out to the students that a tremendous amount of research takes place in order to make products so safe that consumers rarely give safety a second thought. Indeed, when a product is found to be unsafe — for example, as the result of post production tampering — it is a front page news item.

2. It is suggested that the student lab activity on precipitation follow the reading. It should require about 25 - 30 minutes to complete and discuss. The main purpose of the activity is to

provide an understanding of how precipitates form — that certain chemical conditions are required. If those conditions are not present, the precipitate will not form whether the reaction takes place in a test tube or in the mouth. This precipitate is actually a complex ion of ammonia and copper which is not stable at extreme pH values (acid or base) and dissolves. Tartar is a calcium precipitate. The active ingredient in Tartar Control Crest, sodium pyrophosphate, fights tartar by interfering with the chemical reaction that produces the precipitate.

It is suggested that 0.1M copper sulfate pentahydrate be used. A stronger solution (e.g., 0.2 - 0.5M) will produce more precipitate, but more vinegar and ammonia will be required to dissolve it. Students should observe a dark blue precipitate in test tubes 2, 3 and 4 as concentrated $NH_3$ or household ammonia is added. As concentrated household vinegar is added to test tube 3, the precipitate breaks up. As more ammonia is added to test tube 4, the precipitate breaks up as a complex ion is formed, giving rise to a deep blue color.

3. As an extension activity, various other precipitates can be investigated using weak (0.1 M) dilutions of the following pairs of solutions:

sodium chloride + silver nitrate ——> silver chloride
lead nitrate + potassium iodide ———> lead iodide
ferric chloride + ammonia ————> ferric hydroxide
cobalt chloride + sodium hydroxide ———> cobalt hydroxide
barium chloride + sodium sulfate ———> barium sulfate

You may wish to have students investigate the above precipitates or select several for a demonstration. Some of the above salts will not be found in the supply rooms of some junior high schools. The reagents in the current activity are familiar substances; most are readily available. Litmus paper may be used in place of pH paper. Follow all directions for handling and storage. Caution the students to avoid oral, eye and skin contact with these solutions.

4. Surfactants are extremely important in any cleaning reaction. They allow maximum area of contact so the reaction may occur more completely. Students may be interested to learn that all detergents contain surfactants, as do some paints, insect sprays and fungicides for the garden and many other products.

To demonstrate the action of surfactants, examine the effect of adding a toothpick dipped in detergent on drops of water scattered over a piece of waxed paper. Notice how the detergent breaks the surface tension of the water drops — that is, decreases the tendency of the molecules of water to cling tightly together, forming round drops. The addition of a surfactant increases the surface area over which the desired substance may become active. In the case of Tartar Control Crest, it allows the tartar-inhibiting chemicals to reach more of the tooth surface, thereby inhibiting tartar formation over a larger area.

# Tartar Control Crest

## A Case Study in Consumer Product Safety

The oldest recorded belief about toothaches is that they were caused by a "toothworm." Ancient Babylonian texts describe toothaches caused by demons that took the shapes of worms and invaded teeth. In ancient Greece, bleeding gums were cauterized with a red-hot iron. In France during the Middle Ages, open markets served as a dental office for the poor. Teeth were extracted by self-taught gypsies. A red-hot knife was plunged into the gum to stop a toothache. Dentists came to the homes of the wealthy, bringing their instruments with them. Their dental drills were thin metal rods turned by rolling them between the palms. Decayed teeth were sometimes drilled and then filled with soft materials that stopped the pain by keeping air from the open cavity. Usually the offending tooth was simply removed.

Regular dental hygiene is an important part of our daily lives. Americans today enjoy an unprecedented level of dental health in spite of a diet high in sugar and other foods that promote tooth decay. The above descriptions of early dentistry bother most readers. Today's visit to the dentist is very different from visits even our grandparents might have taken. We find it hard to believe that one of the most basic notions of dental science — the role of bacterial infection in tooth decay — was not discovered until the end of the 19th century, more than 4,000 years after the first descriptions of the Babylonian "toothworm."

Most adults brush their teeth at least twice daily. Many young people, especially those who wear braces, brush even more often. Can you think of another consumer product besides toothpaste we put into our mouths more often, and on a regular basis for our entire lives? Probably not. We expect toothpaste to cause problems for cavities, not for us. Few of us realize the extensive behind-the-scenes scientific testing which goes on to make sure our dental care products continue to be effective and safe.

In the late 1930s, Procter & Gamble invested an enormous amount of time, money and other resources to produce a toothpaste that would fight cavities. Many different formulations were tried before a compound called stannous flouride was proven to be effective in preventing tooth decay. Numerous long-term clinical trials with children and adults were then conducted, supervised by doctors and scientists, to ensure the product was safe and effective. At the end of the tests, the number, location and severity of cavities were compared. The results were clear. People who brushed with a toothpaste containing stannous flouride had significantly fewer cavities than people using the same toothpaste without the flouride formula.

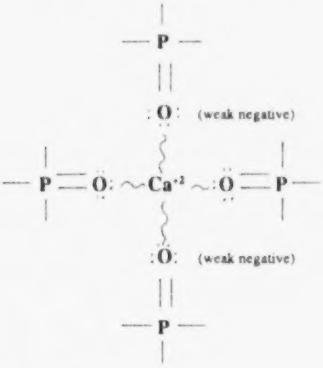
The new formula was given the name "Crest." In 1960, the American Dental Association (ADA) publicly recognized Crest's effectiveness in reducing cavities "...when used in a conscientiously applied program of oral hygiene and regular professional care." This was the first time the ADA had ever endorsed a particular toothpaste to the public.

But how does Crest reduce the chance of tooth decay? The important role of bacteria in tooth decay was mentioned earlier. In fact, just minutes after you brush, a thin coating of bacteria called placque may form on tooth surfaces. These bacteria break down the sugar and similar molecules in foods into acids which then attack tooth enamel. Over time, this erosion can lead to cavities. The stannous flouride in Crest attaches to the calcium compounds in tooth enamel, making the enamel stronger and more resistant to decay.

Recently, dental health specialists have become concerned with tartar, or dental calculus, as it is called. Tartar is caused by a gradual buildup of placque over time until it becomes thick and hard. Uncontrolled build-up of placque can produce a condition called gingivitis which is an inflammation or swelling of the gum tissue that surrounds the tooth. Other problems can also occur and may result in premature tooth loss. The scientists at Procter & Gamble decided that a toothpaste that would inhibit tartar formation would be very important.

Chemically, tartar is a calcium precipitate. A precipitate is a solid substance that forms from liquid solutions. Certain conditions are necessary for precipitates to form. If these conditions are not present or are altered, the precipitate will not form properly. Procter & Gamble scientists had to find a safe way to change the conditions in the mouth that allow tartar to form. First, the chemical structure of tartar was analyzed. Scientists must know how a chemical is constructed in order to find a way to attack it. A thorough search of various chemicals that would inhibit tartar formation was conducted. On the basis of safety factors, effectiveness and manufacturing cost, sodium pyrophosphate was chosen for more testing.

Sodium pyrophosphate fights tartar by a process known as chelation. A chelate is a compound in which the central atom (in this case, calcium) is attracted by two or more bonds, forming a surrounding structure.



*Chelators surround the positively charged calcium cation with weak negative charges. This suspends the calcium cation in solution and prevents or slows down its ability to combine with other materials.*

Normally, the tartar that forms on your teeth is a hard, calcium-containing deposit. When a toothpaste containing sodium pyrophosphate is used, the tartar that forms is weaker. It crumbles easily under the action of your toothbrush. How does sodium pyrophosphate make the tartar weaker? It forms chemical bonds with the calcium network in crystals of tartar, reducing the cross-linking bonds that would normally form. As we've seen, the tartar that forms is not nearly as strong. But there were many parts to the problem. In order to allow the active ingredient to spread evenly over the tooth surface, the right surfactant or spreading agent had to be formulated.

But was pyrophosphate safe to use? It was known that ingestion of certain chelating agents can lead to health problems in humans. Since millions of people would be using the new toothpaste, it was necessary to test the product to make sure it was absolutely safe for humans. This is an essential phase of all consumer product development at Procter & Gamble. Company policy states that products must be safe for their intended use and for cases of foreseeable misuse. After an extensive battery of safety tests, including animal tests, it was concluded that the new formulation was safe for human use.

The product was then tested in clinical trials supervised by scientists and dental care professionals, often in double blind studies. A "double blind" study is one in which the exact identity of the substance being tested is kept secret from both the participants and the researchers. In carefully controlled studies, various formulations containing sodium pyrophosphate proved effective in controlling tartar, reducing deposits by more than 44% in some cases. Participants in the study represented a cross-section of the population with regard to age, brushing habits and other factors.

Decisions regarding the flavor formulation were needed. Sodium pyrophosphate has a very salty taste. Several flavors were tried before one was found which masked the salty taste but which consumers did not find too strong. In 1985, Tartar Control Crest was first marketed. Its presence on an increasing number of toothbrushes daily is the result of a long chain of company decisions, many of them made with important information from scientists and researchers.

## Questions

1. When was the role of bacterial infection in tooth decay first discovered?

2. Why were clinical trials necessary to prove the effectiveness of sodium flouride and sodium pyrophosphate?

3. Why was the ADA endorsement of Crest in 1960 important?

4. What is placque? What is its role in tooth decay?

5. What is tartar? What is its role in tooth decay?

6. What is a precipitate?

7. How does sodium pyrophosphate inhibit tartar formation?

8. What is a chelate?

# Tartar Control Crest

## Suggested answers to questions on the student reading

1. **WHEN WAS THE ROLE OF BACTERIAL INFECTION IN TOOTH DECAY FIRST DISCOVERED?**

*The role of bacterial infection in tooth decay was not discovered until the end of the 19th century, more than 4,000 years after the first descriptions of the Babylonian "toothworm."*

2. **WHY WERE CLINICAL TRIALS NECESSARY TO PROVE THE EFFECTIVENESS OF SODIUM FLOURIDE AND SODIUM PYROPHOSPHATE?**

*Laboratory data provide information on effectiveness under controlled conditions. Clinical trials are necessary to prove an ingredient is effective in real life situations which are less uniform. Up until this point, the effectiveness had only been demonstrated in the laboratory. Scientists knew that to prove the effectiveness under normal conditions of use would be quite another task.*

3. **WHY WAS THE ADA ENDORSEMENT OF CREST IN 1960 IMPORTANT?**

*It marked the first time the ADA had publicly endorsed any toothpaste and validated all research efforts to show that Crest did fight cavities.*

4. **WHAT IS PLACQUE? WHAT IS ITS ROLE IN TOOTH DECAY?**

*Placque is a thin coating of bacteria which forms on many tooth surfaces in your mouth. These bacteria break down the sugar and similar molecules in foods into acids which then erode tooth enamel. Over time, this erosion can lead to cavities.*

5. **WHAT IS TARTAR? WHAT IS ITS ROLE IN TOOTH DECAY?**

*Tartar is caused by a gradual buildup of placque over time, until the placque layer becomes thick and hard. This can produce a condition called gingivitis which is characterized by an inflammation or swelling of the gum tissue that surrounds the tooth. Other gum-related problems can also occur, and can result in premature tooth loss.*

6. **WHAT IS A PRECIPITATE?**

*A precipitate is a solid that forms as a result of a chemical reaction between two liquids.*

7. **HOW DOES SODIUM PYROPHOSPHATE INHIBIT TARTAR FORMATION?**

*Sodium pyrophosphate works by altering the chemical structure of tartar. Instead of a normally hard calcium deposit, the tartar that forms when pyrophosphate is used is much weaker and crumbles easily under the action of brushing. Sodium pyrophosphate forms chemical bonds with the calcium network in crystals of tartar, reducing the number and strength of cross-linking bonds that would normally form.*

8. **WHAT IS A CHELATE?**

*A chelate is a compound in which the central atom (in this case, calcium) is attracted by two or more bonds, forming a surrounding structure.*

STUDENT
ACTIVITY

# Precipitation

## Purpose

The tartar that forms on the surface of your teeth is a chemical precipitate. This lab will help you investigate precipitates and the conditions under which they occur.

## Materials

per student team of 2-4:
copper sulfate, $CuSO_4 \cdot 5H_2O$, 0.1 M
household ammonia
household vinegar
1 test tube rack
4 small test tubes
pH paper or litmus paper
masking tape
marking pen
medicine dropper
straw or stirring rod

## Safety notes

**Wash your hands thoroughly before and after the activity. Do not touch the chemicals or bring them into contact with eyes, nose or mouth. Wear safety eyewear as directed by your teacher. Observe all warnings and cautions and methods of handling chemicals recommended on the bottles.**

## Procedure

Read the entire procedure through before starting. If you have any questions, ask your teacher. Make sure lab glassware is clean before using.

1. Use masking tape and a marking pen to label the test tubes 1-4.

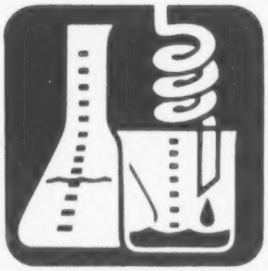
2. Use the medicine dropper to add 20 drops of copper sulfate to each test tube. Rinse the medicine dropper thoroughly after use.

3. Use pH paper to test the pH of tubes 1-4. Record your observations in the data table.

4. Add 5 drops of household ammonia to test tubes 2, 3 and 4. What happens?

The solid that forms is called a precipitate. A precipitate is a solid that forms from two liquids. This particular precipitate is formed from ammonia and copper sulfate. Test the pH of the solution in test tubes 2-4 with pH paper or litmus paper. Record your observations in the data table.

5. Add 10 drops of household vinegar to test tube 3. Stir well to mix. Rinse the medicine dropper thoroughly after use. What happens?



Test the pH of the solution using pH paper. If the precipitate still remains, add additional drops until it dissolves. (This should not require more than 10-15 more drops.) Record your observations in the data table.

6. Add 5 more drops of ammonia to test tube 4. Rinse the medicine dropper thoroughly after use. Stir well to mix. If the precipitate still remains, add additional drops until it dissolves. (This should not require more than 10-15 more drops.) Describe what happens.

Test the pH of the solution using pH paper. Record your observations in the data table. The dark blue color your observe is the result of the formation of a complex ion composed of copper and ammonia.

Data table

| | test tube 1 | test tube 2 | test tube 3 | test tube 4 |
|---|---|---|---|---|
| color of solution before ammonia is added | | | | |
| pH before ammonia is added | | | | |
| color of solution after ammonia is added (tubes 2, 3, 4) | | | | |
| pH after ammonia is added (tubes 2, 3, 4) | | | | |
| pH after vinegar is added (tube 3) | | | | |
| pH after excess ammonia is added (tube 4) | | | | |

## Questions

1. What was the purpose of test tube 1?

2. What is a precipitate?

3. What is the effect of vinegar on the precipitate in test tube 3?

4. What is the effect of excess ammonia on the precipitate in test tube 4?

5. Can you make a general statement about the effects of pH on the precipitate in this activity?

6. In the student reading you learned that Tartar Control Crest changes the chemical composition of tartar. How does this help prevent tartar from forming? How does this activity show that precipitates can be affected by changing conditions?

# Precipitation

## Suggested answers to questions in the student activity

**Data table**

| | test tube 1 | test tube 2 | test tube 3 | test tube 4 |
|---|---|---|---|---|
| color of solution before ammonia is added | light blue | light blue | light blue | light blue |
| pH before ammonia is added | <------------------------------varies; should be 7-8------------------------> | | | |
| color of solution after ammonia is added (tubes 2, 3, 4) | | dark blue solid forms in tubes 2-4 | | |
| pH after ammonia is added (tubes 2, 3, 4) | | <-------------varies; should be 9-10------------> | | |
| pH after vinegar is added (tube 3) | | | acidic (<7) or neutral (7) | |
| pH after excess ammonia is added (tube 4) | | | | basic (9-10) |

1. **WHAT WAS THE PURPOSE OF TEST TUBE 1?**

   *Test tube 1 was the control for the activity. It is provided as a reference color standard for the other test tubes.*

2. **WHAT IS A PRECIPITATE?**

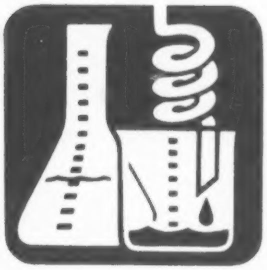
   *A solid that forms from two liquids.*

3. **WHAT IS THE EFFECT OF VINEGAR ON THE PRECIPITATE IN TEST TUBE 3?**

   *Vinegar, an acid, dissolves the copper hydroxide precipitate. It does so by attacking the hydroxide ion, releasing the copper into solution.*

4. **WHAT IS THE EFFECT OF EXCESS AMMONIA ON THE PRECIPITATE IN TEST TUBE 4?**

   *The dark blue color is the result of the formation of a complex ion composed of copper and ammonia. When excess ammonia is present, the precipitate dissolves and forms a different compound.*



**5. CAN YOU MAKE A GENERAL STATEMENT ABOUT THE EFFECTS OF PH ON PRECIPITATES IN THIS ACTIVITY?**

*Students should indicate that acidifying the copper hydroxide precipitate makes it dissolve. It cannot be said with certainty that making the solution basic will always dissolve the precipitate since the ammonia (which is a base) is involved in the formation of a complex ion. Sodium hydroxide, a common base, will not form a complex with copper.*

**6. IN THE STUDENT READING YOU LEARNED THAT TARTAR CONTROL CREST CHANGES THE CHEMICAL COMPOSITION OF TARTAR. HOW DOES THIS HELP PREVENT TARTAR FROM FORMING? HOW DOES THIS ACTIVITY SHOW THAT PRECIPITATES CAN BE AFFECTED BY CHANGING CONDITIONS?**

*Tartar Control Crest uses sodium pyrophosphate to alter the chemical structure of the tartar. Instead of a hard deposit, the tartar that forms is weaker and crumbles more easily under the effects of brushing. Students learn from this acitivity that precipitates in general require specific chemical conditions, and that if these conditions are not present, they will not form.*

# Risk

### Overview

Students rank order a list of 15 different risks and compare their estimates to the actual data. Students then investigate basic concepts of risk comparison as they examine a selected group of activities that carry a probability of death of one in one million. Students compile a personal "risk log," noting their actions and associated risks for a predetermined period of time and compare their total risk loads with those of other students. During the discussion which follows, students realize that all activities have associated risks; that risks can be determined mathematically and compared; and that "zero risk," although it sounds attractive, is not really attainable.

Related activities on risk are included in the Economics section of the unit.

### Time required

This unit will require one to two class periods.

### Objectives

Students who participate in this activity should be able to:

1. Realize that all actions involve some risks.
2. Recall that risks can be determined mathematically and can be compared.
3. Recall that acceptance of particular risks depends upon a variety of factors including perception of benefit, equal sharing of risk, personal choice and "life-style" variables.
4. Recall that some risks can be avoided and give strategies for avoiding risks.

### Advance preparation

Duplicate sufficient copies of the student activity sheet and the student reading. Instruct the students not to mark on copies of the student reading if you plan to reuse it with other students.

### Teaching strategies

1. To begin the discussion you will probably need to define "risk." Generally risk has negative connotations; one rarely speaks of the risks of winning a lottery. Risk of death is defined by experts as the statistics or odds involving loss of life in a particular fashion. A key point to raise early with the students is that risk information on various activities can be compared and this information can be used to place a given risk in perspective.

2. It is suggested that the student activity on risk ranking be done first. Assign students to groups of three or four. This activity can also be performed as an individual exercise. Distribute the student worksheet to the students. Allow sufficient time (10-15 minutes) for them to work through the examples. Discuss their answers with them, asking whether anyone was surprised by the actual data or has any questions. Below are actual risk data for use with your students (adapted from Atallah, S., "Assessing and Managing Industrial Risks." Chemical Engineering, September 8, 1980, pages 99-103)

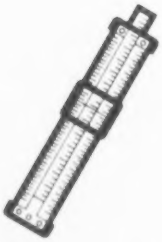
## Annual Risk of Death in the United States

| Totai number deaths | Risk per million persons | Hazard | Rank |
|---|---|---|---|
| 16,300 | 74 | accidental falls | 6 |
| 3,800 | 17 | accidental poisoning | 9 |
| 351,055 | 1600 | cancer (all types) | 2 |
| 1,757 | 0.8 | commercial aviation accidents | 12 |
| 8,100 | 37 | drowning | 7 |
| 6,500 | 30 | fires, burns | 8 |
| 757,075 | 3400 | heart disease | 1 |
| 20,465 | 93 | homicides (being murdered) | 5 |
| 2,400 | 11 | hunting accidents | 11 |
| 124 | 0.5 | lightning | 13 |
| 46,200 | 210 | motor vehicle accidents | 3 |
| estimated | 0.00001 | struck by meteorites | 15 |
| 2,900 | 13 | suffocation, choking | 10 |
| 91 | 0.4 | tornadoes | 14 |
| 13,400 | 150 | work accidents | 4 |

In your discussion of risk, point out that the risks are listed in terms of danger to the population at risk. Every year, about 2400 persons die in hunting accidents in the United States. This represents 11 deaths per million persons, a standard method of comparing risks. However, since everyone in the United States is not exposed to this risk, the rate per million hunters would be much higher. Contrast the risks associated with hunting to those associated with cancer (all types). It is assumed that the population at risk is the entire United States since we all are subject to genetic and environmental factors which may lead to cancer; on the other hand, not all of us choose to hunt. It is important to discuss differences in these kinds of risks with your students as you compare risks from different activities. Ask the question: Who is exposed to this risk? Everyone? A select few persons?

3. Additional activities involve student-compiled "risk diaries" to use later, student background readings and the examination of a "one-in-a-million" risk table. It is suggested that the risk diary be started early and examined for discussion after one or two weeks have passed.

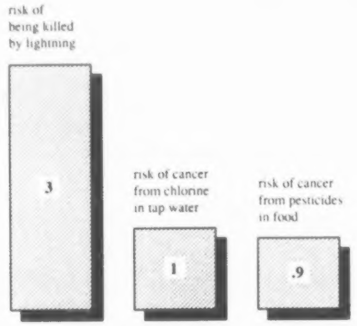
The following table may be used to make an overhead transparency or written directly on the chalkboard for discussion with the students.



## Risks Which Increase The Chance of Death By One in a Million

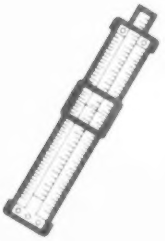
| Action | Cause |
|---|---|
| smoking 1.4 cigarettes | cancer, heart disease |
| drinking 1/2 liter of wine | cirrhosis of the liver |
| spending 1 hour in a coal mine | black lung disease |
| living 2 days in Boston or New York | air pollution |
| traveling 6 minutes by canoe | accident |
| traveling 10 miles by bicycle | accident |
| flying 1000 miles by jet | accident |
| traveling 150 miles by car | accident |
| traveling 6000 miles by jet | cancer caused by cosmic radiation |
| living 2 months in brick building | cancer from natural radioactivity |
| one chest X-ray | cancer from radiation |
| drinking Miami city water for 1 year | cancer from chlorine in the water |
| living within 5 miles of a nuclear power plant for 50 years | cancer from accidental radiation release |
| living within 20 miles of a nuclear power plant for 150 years | cancer from radiation |
| eating 100 barbecued steaks | cancer from benzopyrene in charcoal |

Selected information from a chart or table often has more impact in the form of a bar graph. For example:



Source: National Center for Policy Analysis, Report 137, April 1989

You may wish to have students compile a "risk diary" in which they record activities for a specified period of time. Some activities which might be included are particular sports such as football, windsurfing, hang-gliding, swimming, diving; part-time jobs in which students might be exposed to an array of occupational hazards (e.g., delivery driver for a local pizzeria); and other activities they suggest. Students can compare their diaries, using them as a basis for introducing and discussing risk.

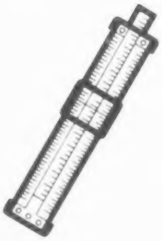


4. Explain to the students that the feeling of personal involvement often leads to a feeling of personal control. This can make risky technology even more dangerous. Many of us feel we are better-than-average drivers, more competent with power tools and healthier than others. We

therefore increase our risks in these activities by not wearing seat belts, not wearing safety eyewear as we operate power tools and not watching our diet more closely.

Tickets in a lottery were used in a study to determine the importance of personal decision in risk-taking. All tickets cost a dollar each. In one group, tickets were given to the participants; participants in the other group got to choose their own. Just before the drawing, all participants were given a chance to sell their tickets. The average resale price of those who had tickets handed to them was $1.96, while those who picked their own would not part with their tickets for less than $8.50.

5. Another activity that allows students to compare dissimilar risks is provided in the student reading selection. All actions listed in the table increase the chances of dying in any year by one in a million. Explain the mathematical basis for the table. Are there any surprises for anyone?



# Risk

The public has come to expect and demand "no-risk" consumer products. By conservative estimates, various consumer products are used by Americans, directly or indirectly, hundreds of millions of times daily. Soap and detergent products alone account for a significant part of this total because they are used in bathing, laundering, dishwashing and any number of household cleaning chores. Making sure the chemical formulations in these products are safe is a major concern of manufacturers like Procter & Gamble.

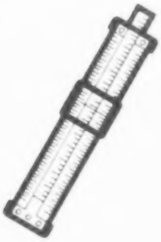
Let's think about the "no risk" concept for a moment. Certainly no one really wants high levels of risk. We are taught from an early age to avoid risks — to look both ways before we cross the street, for example. Major companies like Procter & Gamble spend a great deal of time, money and effort reducing risks. Detergents aren't supposed to be eaten or splashed in the eyes, but experience has shown that young children are prone to these kinds of accidents. If a product designed for laundering clothes is used instead for washing dishes, what kinds of risks might there be in using dishes that are not rinsed properly? Can detergent formulations be found that will never cause a mild skin irritation to anyone?

The notion of "zero risk" is an attractive one. It is hard to be objective where risks and human life are concerned. If you will think about it for a moment, you will realize that all actions involve risks of some kind. We all take risks everyday. Some of us choose to risk our health for elective surgical procedures — for improved vision, for a more youthful appearance or for other benefits. Most of the time, our risk-taking is almost instinctive. We use an old chair to reach that box on the top shelf instead of getting a ladder, or play contact sports without safety equipment. We might even risk our own life trying to save a drowning child. Even when we take the time to think, sometimes our analysis of various risks is quite irrational. We worry about cancer from saccharin in diet food and drinks, but continue to puff away at cigarettes while riding in an automobile without fastening our safety belts.

We assume many risks without much thought because they involve personal choice and appeal to us in some way — driving a car, skateboarding, climbing a tree. These are called voluntary risks. Risks that are forced upon us are called involuntary risks and generally make us uneasy. A familiar example is travel by automobile and by commercial airplane. Driving to the airport behind the wheel of a car, we feel somehow more safe than on board the jet where the captain has the wheel — even though we know traveling by airplane is statistically much safer than traveling in an automobile.

The media has a role in our perception of risk. Diseases such as diabetes, heart disease and cancer take about 16 times the number of lives each year as do accidents at home or in the workplace, yet in one study involving areas in Massachusetts and Oregon, there were more than six times more newspaper articles written about accidental deaths than articles written about those major diseases. This kind of "victim-oriented" reporting tends to leave us all with a vague dread about such things as the next earthquake, lead poisoning, cancer risk of X-rays, dioxin, jet crashes, chemicals in our food, water and air and dozens of others.

Besides media attention, many other factors affect our perception and judgment of risk. One of these is our familiarity with the risk and whether the risk is well understood. We tend to underestimate the risks of everyday actions because we perform them routinely. Risks that are highly technical in nature or require specialized knowledge — such as the risks of a new medical procedure — tend to be harder for us to judge and compare. Another factor is our perception of the benefits of the risk. Some of us might say that a risk that has a highly desirable outcome is worth taking, as in the case of a patient with a terminal illness who volunteers for an experimental medical treatment.

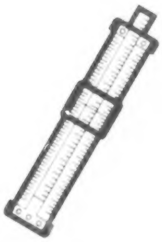


Still another factor is whether the risk is voluntary (our choice) or involuntary (forced on us), as mentioned earlier. Another factor is whether we perceive the risk to be shared equally by all involved. The 100 people who share a risk equally that all might benefit will feel differently than another group of 100 people who share the same risk if only 2 persons from the group might benefit. Finally, there is the catastrophic potential of the risk — whether a large number of people might be injured or lose their lives in a single incident, such as from an airplane crash.

A town meeting held to discuss the possibility of locating a nuclear power plant outside the town provides an opportunity to see many of these factors at work. Citizens who attend the meeting may complain of a lack of basic understanding of nuclear technology, remarking that this knowledge is not familiar to many (if not all) of the residents. They may say they were not consulted early in the review process and therefore have not had sufficient time or opportunities to make their opinions known. They may declare that the potential for accidents leading to major disasters at nuclear power plant is known to all who attend movies. They may say that the risk is distributed unfairly — people who live a great distance away from the plant will be able to use the electricity with minimal risk.

Actually, from a risk standpoint, nuclear reactors in this country are quite safe. Accidents in nuclear power plants have claimed just 3 lives in the United States over the last 30 years.

Risks of different types can be compared statistically. This adds perspective to an otherwise unfamiliar situation. For example, the risk of cancer from pesticides in food is less than the cancer risk from chlorine in the water you drink; both of these risks are about three times less than the risk of being killed by lightning. Comparing dissimilar risks has been likened to comparing apples and oranges. The risk of being killed by lightning has no relation to the risk of cancer from pesticide residues, but it is helpful to compare risks using a standard measure. The standard measure compares the risk of death from a hazard for one person compared with one million persons exposed to the same hazard. Your teacher will share with you some information regarding "one in a million" risks.



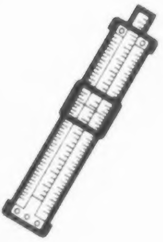
The point of risk comparison and risk-benefit analysis is to give an objective look at the risks involved in terms of the benefits of the activity concerned. Preservatives are used in processed foods because the health-associated risks of spoiled food outweigh those associated with the use of preservatives. The risk from pesticides is 100 times less than the risk from natural carcinogens (cancer-causing agents) in a raw mushroom and thousands of times less than the natural carcinogens in wine or beer. Part of the public's confusion and concern can be traced to a heightened environmental awareness conveyed by our sophisticated laboratory methods. We can now detect substances at concentration levels of parts per quadrillion — one drop of dishwashing detergent dissolved in enough water to fill a string of railroad tank cars 10,000 miles long! In fact, it is much easier to detect the mere presence of a chemical than to tell whether the chemical is safe.

Technology is often blamed for today's problems. But technology has had a hand in curing many problems, too. Many people think life today is somehow more dangerous, more difficult and more hazardous than life in the past even though we live much longer and are generally healthier and freer from disease than at any other time in our history! In 1907, 20% of all people died before they reached age 15 — by 1987 the 20% age-death figure had increased to more than 59 years. Babies born today generally enjoy a much longer, healthier life than was possible in 1907, when 1 in 10 babies did not live past its first year. The average life expectancy in Japan and other highly industrialized countries such as the United States and most of western Europe is about 71 years; in developing nations such as Africa's Ivory Coast, it's less than 50 years.

All of us experience risk on a daily basis. By understanding more about risk, we are able to make more informed choices about the risks that really matter and spend less time, money and energy over risks we need not worry about.

## Questions

1. Is a "no risk" concept a sound one? Is it possible? Explain your answer.
2. What are a few common risks we might take everyday?
3. What is the difference between voluntary and involuntary risks?
4. What is the role of the media in our understanding of risk?
5. Name some of the other factors that influence the perception of risk and give an example of how each factor might influence its perception.
6. How is it possible to compare risks of different types?
7. Name an activity that might increase the chance of death by two in a million. By three in a million. By four in a million.
8. How does our sophisticated technology affect our perception of risk?
9. Is life more risky today than 75 years ago? Explain.
10. Why take the time to be informed about risk?



# Risk

## Suggested answers to questions in the student reading

**1. IS A "NO RISK" CONCEPT A SOUND ONE? IS IT POSSIBLE? EXPLAIN YOUR ANSWER.**

*"No risk" is not really a sound, logical concept. All activities, from the ordinary to the spectacular, involve risk. Walking down stairs and sport parachuting both involve risk. Everything we do involves some risk.*

**2. WHAT ARE A FEW COMMON RISKS WE MIGHT TAKE EVERYDAY?**

*Student answers vary. Accept all reasonable responses.*

**3. WHAT IS THE DIFFERENCE BETWEEN VOLUNTARY AND INVOLUNTARY RISKS?**

*A voluntary risk is one we assume ourselves, a risk to which we are exposed through conscious decision. An involuntary risk is a risk others thrust upon us, one in which we have little input. Smoking is a voluntary risk, an airplane accident is an involuntary risk.*

**4. WHAT IS THE ROLE OF THE MEDIA IN OUR UNDERSTANDING OF RISK?**

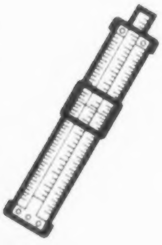
*"Victim-oriented" reporting and other selective techniques can lead to a distorted view. A plane crash in which 12 of the 112 aboard are killed would not have the same impact with a headline reading: "Plane crashes —100 live!" instead of one reading "Plane crashes — 12 die!" Ask the students which they are more likely to see in the newspaper and whether that influences their perception of the risk of flying.*

**5. NAME SOME OF THE OTHER FACTORS THAT INFLUENCE THE PERCEPTION OF RISK AND GIVE AN EXAMPLE OF HOW EACH FACTOR MIGHT INFLUENCE ITS PERCEPTION.**

*Some of the factors which affect our perception of risk include our familiarity with and understanding of the risk; whether we feel we can control the risk; benefits of the risk; whether the risk is voluntary or involuntary; whether the risk is shared equally by all involved; and the catastrophic potential of the risk. Student examples may vary. Accept all reasonable responses.*

**6. HOW IS IT POSSIBLE TO COMPARE RISKS OF DIFFERENT TYPES?**

*Risks of different types can be compared mathematically and statistically on the basis of the likelihood of an event happening to a single individual in a large group of people, e.g., one person out of one million.*



7. **NAME AN ACTIVITY THAT MIGHT INCREASE THE CHANCE OF DEATH BY TWO IN A MILLION. BY THREE IN A MILLION. BY FOUR IN A MILLION.**

*Student answers will vary but should indicate examples from the one-in-one-million risk chart using whole number multipliers of 2, 3 and 4. Accept all reasonable responses.*

8. **HOW DOES OUR SOPHISTICATED TECHNOLOGY AFFECT OUR PERCEPTION OF RISK?**

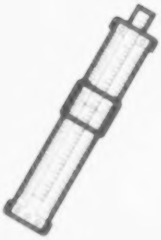
*We are able to detect the presence of chemicals and monitor their effects at concentrations unheard of 30 (or even 10) years ago. The mere presence of a chemical does not of itself give cause for alarm. It must be demonstrated that harmful effects result from this concentration.*

9. **IS LIFE MORE RISKY TODAY THAN 75 YEARS AGO? EXPLAIN.**

*Certainly there are new and different risks from those our grandparents faced 75 years ago. (For one thing, automobile accidents claimed far fewer lives!) However, if longevity is any indicator, life is less risky since the average life expectancy has increased dramatically.*

10. **WHY TAKE THE TIME TO BE INFORMED ABOUT RISK?**

*We are bombarded with risk data every day of our lives, from cereals which claim to lower cholesterol levels, to "risk free" investments to "natural" foods. Balancing the claims and inferences with some appeal to the evidence helps us better analyze this overwhelming amount of risk information.*



STUDENT
ACTIVITY

# Risk

Rank the following annual risks of death in the United States from 1 to 15, with 1 indicating the highest risk of death, 2 the second highest risk and so on. When you have finished, your teacher will list the actual numbers and discuss them with you.

## Annual Risk of Death in the United States

| Your rank | Actual Rank | Hazard |
|---|---|---|
| ________ | ________ | accidental falls |
| ________ | ________ | accidental poisoning |
| ________ | ________ | cancer |
| ________ | ________ | commercial aviation accidents |
| ________ | ________ | drowning |
| ________ | ________ | fires, burns |
| ________ | ________ | heart disease |
| ________ | ________ | homicides (being murdered) |
| ________ | ________ | hunting accidents |
| ________ | ________ | lightning |
| ________ | ________ | motor vehicle accidents |
| ________ | ________ | struck by meteorites |
| ________ | ________ | suffocation, choking |
| ________ | ________ | tornadoes |
| ________ | ________ | work accidents |

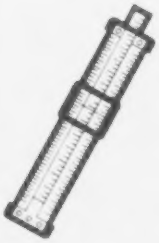
# Risk

## Suggested answers to questions in the student reading

Have students rank the following annual risks of death in the United States from 1 to 15, with 1 indicating the highest risk of death, 2 the second highest risk and so on. When they have finished, list the actual numbers and discuss them.

### Annual Risk of Death in the United States

| Actual Rank | Hazard |
|---|---|
| *6* | accidental falls |
| *9* | accidental poisoning |
| *2* | cancer |
| *12* | commercial aviation accidents |
| *7* | drowning |
| *8* | fires, burns |
| *1* | heart disease |
| *5* | homicides (being murdered) |
| *11* | hunting accidents |
| *13* | lightning |
| *3* | motor vehicle accidents |
| *15* | struck by meteorites |
| *10* | suffocation, choking |
| *14* | tornadoes |
| *4* | work accidents |



# Toxicity

### Overview

Students taste dilutions of Tartar Control Crest in order to establish a taste threshold for the product. As they discuss variations in threshold responses among the members of the class, they are introduced to the general notion that not all humans react to the same chemical in the same way. Students then compare this taste threshold for toothpaste with thresholds for other substances to understand that the human body reacts to different chemical substances in different ways and that thresholds of various substances vary widely.

Students investigate the concept of threshold as they consider the question: Considering the variation in human response to chemicals, how do scientists make sure a consumer product such as Tartar Control Crest may be safely used by all? This leads to an investigation of toxicity in which the effects of dose, route of exposure, intrinsic toxic potential, and duration and frequency of exposure are discussed. Procter & Gamble's support of efforts by scientists to refine necessary animal testing techniques that greatly reduce animal use without compromising consumer safety is discussed.

In order to explore the differences between acute and chronic toxicity, students estimate their total lifetime ingestion of toothpaste and contrast this to the amount that might be ingested accidentally. The threshold responses of family members or friends can be investigated (as an optional activity) to examine the possible influence of age-related and other variables.

### Time required

Three class periods for all activities and discussion

### Science concepts covered in this unit

Dilution
Threshold level
Toxicity
Acute toxicity
Chronic toxicity

### Objectives

Students who participate in this activity should be able to:

1. Describe what is meant by threshold limit value (TLV).
2. Recall that different chemical substances have different associated threshold limit values.
3. Describe the differences between acute and chronic toxicity.
4. Describe how dose, duration, frequency and route of exposure and intrinsic toxic potential contribute to an overall assessment of the toxicity of a chemical.
5. Summarize the importance of information on the beneficial and toxic effects of chemicals in our daily lives.

### Advance preparation

Duplicate sufficient copies of the student activity sheets and the student reading. Instruct the students not to mark on copies of the student reading if you plan to reuse it with other students. If you plan to do the student activities, make sure the necessary materials are arranged for efficient distribution for the students. One family-size (6.4 oz.) tube of Tartar Control Crest should provide enough toothpaste for 5 class periods if students work in groups and measure carefully.

## Teaching strategies

1. The Tartar Control Crest activity sets the stage for a discussion of difference in individual response to chemicals. It is recommended that this activity come first in the sequence. You should allow one class period for the activity and discussion. It is helpful to use the chalkboard, overhead projector or similar method of displaying class results to emphasize the differences in individual response.

You may wish to do this activity as a demonstration, using 10-15 student volunteers, and displaying results for class discussion. If Tartar Control Crest is used, recommend the students taste and spit rather than swallowing. This procedure can also be performed with other substances such as lemonade powder, Kool Aid or similar products. You should obtain results similar to the Tartar Control Crest activity — that is, noticing a variation in individual response given a sufficiently large number of students. Stress to the students that we all have different metabolic rates and other factors which make us react differently to chemicals. Of course, given a large enough sample (e.g., the human population) certain limits appear. It is the job of toxicologists and other scientists to determine those limits for which human safety is not compromised.

Most students will be able to detect Tartar Control Crest at 1 part toothpaste per 100 parts water (1% solution). Although some students may be able to taste Crest at levels lower than this, most will not.

2. It is recommended that the student reading selection follow the Tartar Control Crest activity. You may wish to read the selection aloud in class or have students read it themselves. Or, it may serve as a homework assignment that can be used to stimulate discussion the next day in class. Answers to the student worksheet are provided.

3. The final activity, LIFETIME INGESTION OF TOOTHPASTE, will require only part of a class period. You may wish to use the extra time for review of previous material or an evaluation activity. Notes on the calculations are provided. As the students compare answers, note the differences and similarities. Contrast the different nature of two problems the toxicologist must face: how to make the product safe for a one-year-old child who might accidentally swallow part (or all) of a tube of toothpaste, and how to determine whether lifetime use of the product will have any deleterious effects. These are questions of acute and chronic toxicity, respectively.

4. You may wish to share the following notes on lifetime toothpaste ingestion with your students: According to a recent study, young children ingest up to seven times more toothpaste per brushing than do adults. The study examined the brushing habits of people in 4 age groups: 2-4 years, 5-7 years, 11-13 years and 20-35 years. The results indicated that young children aged 2-4 years ingested about .30 gram of toothpaste each time they brushed their teeth. The amount of toothpaste ingested by adults aged 20-35 is about .04 gram per brushing.

The results of the study are hardly surprising to anyone who has watched a toothbrush loaded with toothpaste disappear into the mouth of a small child. If a reasonable lifetime average of .05 grams of toothpaste ingested per brushing is used, this works out to a lifetime ingestion of over 13 tubes of toothpaste!

The following calculations for lifetime ingestion assume an average lifespan of 71 years for both males and females and regular brushing twice daily for 69 of those years:

69 years x 365 days a year x 2 brushings a day x .05 grams ingested per brushing
= 2518.5 grams of toothpaste ingested!

The family size tube of Tartar Control Crest contains 6.4 ounces or 182.4 grams of toothpaste. Dividing 2518.5 grams ingested by 182.4 grams per tube yields a figure of over 13 tubes of toothpaste!

Scientists are interested in these kinds of numbers as they determine the chronic toxicity of the chemicals used in the toothpaste needed for a determination of product safety. They want to make sure that the long-term consumption of the flouride used to fight tooth decay and the pyrophosphates used to fight tartar do not pose any health risks to consumers.

STUDENT
READING

# Toxicity

Toxicology is the study of toxic properties of substances. Toxicologists concern themselves with the harmful effects of chemicals in our lives. For many of us, the word "chemical" has a negative meaning so that "toxic chemical" is a redundancy. However, all chemicals can have toxic effects. Toxic effects depend on a number of factors. One of these is the dose. A two-year old child can swallow one teaspoon of salt safely, but 10 teaspoons might kill the child. Another of these factors is the route of exposure — the way the chemical enters the human body. This is generally by mouth, through the skin or through the lungs. Furniture polish accidentally sprayed on the skin may have no toxic effects. The same polish may be very toxic if taken into the mouth or lungs. Other factors which relate to toxicity include frequency and duration of exposure — how often one is exposed to a chemical and the length of time one is exposed — and the toxicity, or harmful effects of the chemical itself.

It is a popular view that natural chemicals are nontoxic. Actually, natural toxins far outnumber those made by humans. Some of the most toxic substances in the world are natural. For example, botulin is produced by bacteria which cause food poisoning. One gram (1/28 of an ounce) of botulin can kill 20 million mice; the lethal human dose of botulin is estimated to be 1/14 millionth of an ounce. It is estimated that the number of natural substances that can cause cancer is far larger than the number of synthetic substances that do.

Many of you might feel that a chemical — whether natural or synthetic — is either poisonous or it is not. This is not the case. In low doses DDD, a potent insecticide, is effective for treating certain forms of adrenal cancer. Coumarin compounds are excellent rodenticides (agents that kill or repel rodents), but they are also valuable drugs used to prevent blood from clotting. The toxicity of these compounds is the same whether used as a drug or as a pesticide. Legally a poison is defined as a substance which has a lethal dose of 50 mg or less per kilogram of body weight. This is about 3/4 of a teaspoon for adults and about 1/8 teaspoon for a two-year-old child. There are very few chemicals that are lethal in such small quantities. Even the majority of synthetic pesticides are not this toxic.

But how do toxicologists and other scientists determine the toxicity of a chemical? What methods are involved? What are the limits of these methods? How can these methods be improved to provide more accurate and reliable information? Toxicologists evaluating the safety of a new chemical or formulation first refer to computer data bases, scientific journals and books to determine whether anyone else has examined the effects of the chemical or formulation. It is often helpful to know the effects of similar chemicals. If no information is available, the toxicologist places the chemical into appropriate testing, including tests using animals and tests using non-living organisms such as cell and tissue cultures. Early stages of the testing procedure may involve the use of bacterial cultures to detect any tendency of the chemical to cause mutations which might lead to cancer.

Often the effects of a particular chemical on humans can not be reliably predicted by such methods and tests using animals are required. Over 90% of all animals used in testing are rodents, especially bred for this purpose. Scientists in most responsible major consumer product companies are committed to searching for alternatives to animal testing. The problem with many of these alternative tests is that they do not reliably predict the effects of chemicals on humans. Thus they are not usable for safety evaluation and are not accepted by the government agencies such as the Food and Drug Administration. The Procter & Gamble Company is committed to a policy which emphasizes using animals in testing only when no alternatives exist. The policy calls for the highest ethical standard of care. Company scientists constantly seek ways to reduce the total number of animals used, to use fewer animals per test, or to replace these animal tests with non-animal tests.

Toxicologists need to determine the level at which a particular chemical has an effect on a living system. This is called the threshold limit value and is one of the basic concepts of toxicity. Individuals vary widely in their responses to chemicals. Some people require only one tablet of aspirin to cure a headache. Some need two or three. Different people have different tolerances for alcohol. Ten mg/kg of parathion, an extremely toxic insecticide, will kill about 1/2 of all rats receiving the dose. But 1/2 of the rats will live. These differences make it hard to determine safe levels of chemicals in our lives. For example, there is a threshold at which a chemical might be effective as a food preservative because it kills bacteria that spoil food. There is also a threshold at which the same chemical might be harmful to humans, causing illness. A toxicologist compares the two values to determine whether the chemical has any real value as a food preservative. If the chemical is effective as a food preservative only at concentrations harmful to humans, it will not be used.

In order to make a complete safety evaluation, toxicologists must investigate both the short-term and long-term effects of exposure. Short-term exposures are called acute effects. Examples of short-term exposures are accidental chemical spills at a factory or the accidental ingestion of a consumer product by a small child. These effects differ from the long-term effects of exposure, called chronic effects. An example of chronic toxicity is the danger of working for many years in an office where other people are smoking.

Some chemicals are very toxic acutely but have no chronic toxic effects in small amounts. They may even be essential. Vitamin D is such a chemical. It has an acute oral toxicity of 10 mg/kg, yet all of us need a dose about one thousand times smaller daily to maintain good health. Vitamin D deficiency results in rickets, and severe deficiency can cause death. If vitamin D were not exempted from the Hazardous Substances Labeling Act since it is a food (in milk) or a drug (as a vitamin), it would be required to carry a poison label. Metallic mercury has no acute oral toxicity; however, chronic exposure to mercury vapors is extremely hazardous to human health. If a child breaks a thermometer, the concern should not be whether any mercury was swallowed, but whether any spilled on the carpet or was ground into the fibers from which it could vaporize slowly.

To predict the long-term or chronic effects of low levels of chemicals in humans, we must test higher levels of the chemical for shorter periods of time. Tests which last for 30 years would be too expensive or impractical. The chronic oral effects of the artificial sweetener saccharin were estimated by giving massive doses to laboratory rodents over a two year period. Public outcry resulted over the disclosure that humans would have to drink 50,000 cans of diet soda in one day to obtain a similar dosage!

In the United States today, we interact with a staggering variety and number of chemicals as a normal part of our daily routine. We take over-the-counter and prescription medication and use a wide variety of consumer products without giving safety a second thought. The knowledge of toxicologists about the line between beneficial and toxic effects of chemicals makes this possible.

## Questions

1. Name the five factors that influence toxicity and give a brief example.

2. What is the difference between synthetic and natural chemicals?

3. What is the chemical definition of "poison"?

4. Can chemicals which are poisons have beneficial uses? Give an example.

5. Name some early steps in the safety evaluation of a new chemical.

6. What is the threshold limit value? Why is it important?

7. What is acute toxicity? Give an example of why it might be important to know the acute toxicity of a chemical.

8. What is chronic toxicity? Give an example of why it might be important to know the chronic toxicity of a chemical.

9. Describe the problems in determining the chronic toxicity of a chemical.

# Toxicity

## Suggested answers to questions on the student reading

1. **NAME THE FIVE FACTORS THAT INFLUENCE TOXICITY AND GIVE A BRIEF EXAMPLE.**

*One of these is the dose. A two-year-old child can swallow one teaspoon of salt safely, but 10 teaspoons would kill the same child. Another factor is the route of exposure — the way the chemical enters the human body, generally by mouth, through the skin or by way of the lungs. Furniture polish accidentally sprayed on the skin may have no toxic effects. The same polish may be very toxic if taken into the mouth or lungs. Other factors which relate to toxicity include frequency and duration of exposure — how often one is exposed to a chemical, the length of time one is exposed — and the toxicity, or harmful effects of the chemical itself.*

2. **WHAT IS THE DIFFERENCE BETWEEN SYNTHETIC AND NATURAL CHEMICALS?**

*Synthetic chemicals are those which are man-made and natural chemicals are those made by living organisms or found as natural gases, liquids and solids.*

3. **WHAT IS THE CHEMICAL DEFINITION OF "POISON"?**

*Chemically and legally, a poison is defined as a substance which has a lethal dose for half of the target population* (LD$_{50}$) *of 50 mg or less per kilogram of body weight.*

4. **CAN CHEMICALS WHICH ARE POISONS HAVE BENEFICIAL USES? GIVE AN EXAMPLE.**

*DDD, a close relative of DDT, a pesticide now banned in the United States, is an insecticide. In low doses DDD is also effective at treating certain forms of adrenal cancer. Coumarin compounds are excellent rodenticides but are also valuable drugs that can be used to prevent the blood from clotting. In general, all chemicals, including foods and medicines, are toxic at high doses even though they may be beneficial at low doses.*

5. **NAME SOME EARLY STEPS IN THE SAFETY EVALUATION OF A NEW CHEMICAL.**

*Toxicologists evaluating the safety of a new chemical or formulation first refer to computer data bases, scientific journals, books and other printed materials to determine whether anyone else has researched the effects of the chemical or formulation in question. It is often helpful to know the effects of similar chemicals on living systems. If no information is available, the toxicologist places the chemical into appropriate testing, including tests using animals and tests using non-living organisms such as cell and tissue cultures. For example, early stages of the testing procedure may involve the use of bacterial cultures to detect any tendency of the chemical to cause mutations in the genetic code which might lead to cancer. Generally, acute toxicity tests are conducted considering all likely routes of entry into the body. Subchronic and chronic tests are performed as appropriate.*

6. **WHAT IS THE THRESHOLD LIMIT VALUE? WHY IS IT IMPORTANT?**

*The threshold limit value is the concentration at which a particular chemical has an effect. The threshold limit value is one of the basic concepts of toxicology. There are as*

*many different thresholds as there are different chemicals and effects. For example, there is a threshold at which a chemical might be effective as a food preservative, and another threshold at which the same chemical might be harmful to humans. A toxicologist would compare the two to determine whether the chemical has any real value as a food preservative. Obviously, if the chemical is effective as a food preservative only at concentrations harmful to humans, it will not be used.*

7. **WHAT IS ACUTE TOXICITY? GIVE AN EXAMPLE OF WHY IT MIGHT BE IMPORTANT TO KNOW THE CHRONIC TOXICITY OF A CHEMICAL.**

*Toxic effects of short-term exposure to a chemical are called acute effects. It would be desirable to know acute toxicity in cases of accidental ingestion of a consumer product by a small child.*

8. **WHAT IS CHRONIC TOXICITY? GIVE AN EXAMPLE OF WHY IT MIGHT BE IMPORTANT TO KNOW THE CHRONIC TOXICITY OF A CHEMICAL.**

*The long-term effects of exposure are called chronic effects. It is desirable to know these effects to predict the effects of long-term exposure to consumers and workers, such as the exposure which might be expected in working for thirty years in an office with several cigarette smokers.*

9. **DESCRIBE THE PROBLEMS IN DETERMINING THE CHRONIC TOXICITY OF A CHEMICAL.**

*Safety tests have their limits. For example, it is generally not practical, feasible or possible to test chronic toxicity in "real time" experiments. The average lifespan for humans is approximately 70 years. To predict the long-term or chronic effects of low levels of chemicals, current protocols use higher levels of the chemical for shorter periods of time. For example, the chronic (lifetime) oral effects of the artificial sweetener saccharin were estimated by giving massive doses to laboratory rodents over a two-year period, their normal lifespan.*

STUDENT
ACTIVITY

# Tartar Control Crest

## Purpose

To determine a taste threshold for Tartar Control Crest

## Materials

for the class:
1 tube of Tartar Control Crest

per student team of 2-4:
ruler
Q-tips, 4 per student
5 plastic cups (cups should hold 8 ounces)
tap water
wax paper, 2" x 4" sheet
felt tipped marker
plastic spoon
pencil
graduated cylinder, 50 ml

## Safety notes

**Do not taste any materials in the lab without permission from your teacher. Wash your hands thoroughly before and after the activity. Make sure lab glassware, especially the graduated cylinder, is clean before using.**

## Procedure

Read the entire procedure before starting. Ask your teacher if you have any questions.

1. Use a clean graduated cylinder to measure 5 ml of tap water. Put the water in one of the plastic cups and use the felt-tipped pen to mark a line at the water level. Repeat this procedure with 45 ml of water. You now have a graduated cup with two lines, one at 5 ml and one at 45 ml.

2. Number the remaining four plastics cups 1-4.

3. With your ruler and pencil, mark a line 6 1/2 cm long on a piece of paper. Put the piece of wax paper over the line. Squeeze out a ribbon of toothpaste as long as the pencil line.

4. Use the plastic spoon to transfer the toothpaste to cup 1. Use your graduated cup to add 45 ml of tap water to the toothpaste and stir to mix well. If toothpaste is considered full strength, then the cup 1 contains a 10% solution, by weight, of toothpaste and water. This is 1 part in 10.

5. Using the graduated cup, pour 5 ml of the solution from cup 1 into cup 2. Add 45 ml of tap water. Stir to mix well. This is a 1% solution of toothpaste and water, or 1 part in 100.

6. Using the graduated cup, pour 5 ml of the solution from cup 2 into cup 3. Add 45 ml of tap water. Stir to mix well. This is a 1/10% solution of toothpaste and water, or 1 part in 1,000.

7. Using the graduated cup, pour 5 ml of the solution from cup 3 into cup 4. Add 45 ml of tap water. Stir to mix well. This is a 1/100% solution of toothpaste and water, or 1 part in 10,000.

8. You are now ready to determine your taste threshold for Tartar Control Crest. Use a Q-tip to transfer a small amount of the solution in cup 4 to your tongue. Can you taste the toothpaste?

9. Rinse your mouth with a little tap water and try some from cup 3. Use different Q-tips to repeat the procedure with mixtures from the other cups. Record the number of the cup in which you could first taste Tartar Control Crest.

Cup in which I could first taste Tartar Control Crest ________.

10. Report your results to your teacher.

## Questions

1. What was the number of the cup in which you could first taste the Tartar Control Crest?

2. Was this the same as for all the members in your group? _________ Was this the same as for all the members in your class?

3. How do you explain any differences in a person's ability to taste Tartar Control Crest?

4. The taste buds in your mouth react to the different chemical molecules that give Tartar Control Crest its flavor. Does the evidence you have obtained in this activity support the conclusion that all people react to chemicals in exactly the same way? Explain your answer.

# Tartar Control Crest

## Suggested answers to questions in the student activity

1. **WHAT WAS THE NUMBER OF THE CUP IN WHICH YOU COULD FIRST TASTE TARTAR CONTROL CREST?**

*Answers vary. Most students will be able to taste Tartar Control Crest at levels of 1 part per hundred and some will report lower taste thresholds for the product.*

2. **WAS THIS THE SAME FOR ALL MEMBERS OF YOUR GROUP? WAS THIS THE SAME FOR ALL MEMBERS OF YOUR CLASS?**

*Answers to these questions vary because student taste threshold levels for Tartar Control Crest vary.*

3. **HOW DO YOU EXPLAIN THE DIFFERENCES IN YOUR ANSWERS TO QUESTION #2? WHAT FACTORS MIGHT INFLUENCE AN INDIVIDUAL'S ABILITY TO TASTE TARTAR CONTROL CREST?**

*Student answers vary, but may include hereditary or genetic factors, influence of diet, recent consumption of other flavors, sense of smell and others.*

4. **THE TASTE BUDS IN YOUR MOUTH REACT TO THE DIFFERENT CHEMICAL MOLECULES THAT GIVE TARTAR CONTROL CREST ITS CHARACTERISTIC FLAVOR. DOES THE EVIDENCE YOU HAVE OBTAINED IN THIS ACTIVITY LEAD YOU TO BELIEVE THAT ALL PEOPLE REACT TO CHEMICALS IN EXACTLY THE SAME WAY?**

*The evidence they have obtained leads to the conclusion that all people do not react to chemicals in exactly the same way.*

STUDENT
ACTIVITY

# Lifetime Ingestion of Toothpaste

Each time you brush your teeth, you swallow a tiny amount — even if you are very careful. How much toothpaste will you swallow in your lifetime? Here's a worksheet to help you find out! We assume a few things to make the calculations easier. If you need help, ask your teacher. Calculators are permitted!

1. How many times do you brush your teeth daily?
   (If your brushing habits vary, report the average value.)

   I brush ______ times a day.

2. Multiply this number by 365 (the number of days in a year).

   I will brush _______ times in a year.

3. Multiply your answer to step 3 by 66 if you are male, by 72 if you are female. These are the average life expectancies for your age group, according to sex, adjusted for the lack of regular brushing habits for the first two years of your life. (Source: U.S. Bureau of Census, 1988)

   I will brush _______ times in my life.

4. Multiply your answer to step 3 by .05. This is the number of grams of toothpaste you swallow each time you brush. This is an average amount, taking into account the fact that young children swallow more toothpaste than adults.

   I will swallow ___________ grams of toothpaste in my life.

5. The family-size tube of Tartar Control Crest is 6.4 ounces or 182.4 grams. Divide the number of grams (step 4) by 182.4 to find out the number of tubes of toothpaste you will swallow in your life.

   I will swallow ___________ tubes of toothpaste in my life.

6. Compare your answers to those of your classmates. Is there much difference?

# Environmental Safety

## Overview

Students recognize that information regarding the environmental fate of a chemical goes hand-in-hand with human safety information to make an overall safety assessment of a new chemical or formulation. Issues in environmental safety, especially the difficulty of developing accurate, predictive models are discussed. Student laboratory activities include paper chromatography as a simulation of techniques used to identify and monitor product residues in the environment, and the effect of various dilutions of consumer products on the viability of algal cultures.

Related activities on the environment are included in "Garbage Decision Making" in the Economics section and "Consumers and Business: Partners in Product Safety" in the Home Economics section of the unit.

## Time required

Two to three class periods for all activities and discussion. The algal cultures lab will require one day to set up but will require monitoring over a longer period of time (1-2 weeks or longer).

## Science concepts covered in this unit

biodegradability
chromatography
ecosystems
environment
limits of scientific knowledge
predicting and monitoring
threshold limit value
toxicity

## Objectives

Students who participate in this activity should be able to:

1. Explain what is meant by environmental safety.

2. Describe key problems in evaluating environmental safety of consumer products.

3. Describe the effects of dilutions of liquid detergent on the growth of algae.

4. Describe how various methods, such as chromatography, can be used to detect and identify very small amounts of chemicals in the environment.

## Advance preparation

Duplicate sufficient copies of the student activity sheets and the student reading. Instruct the students not to mark on copies of the student reading if you plan to reuse it with other students. If you plan for your students to complete the student activities, make sure the necessary materials are arranged for efficient distribution.

The algal cultures for the first activity may be obtained locally. Set up the cultures in class a few days prior to starting. Scrapings from the side of a outdoor cement pond, freshwater aquarium or similar container can be used to make a culture to supply the class. Place the scrapings in a clear glass or plastic container — a small aquarium is ideal — of pond water or tap water which has been allowed to sit for at least a day so that any chlorine will have dissipated. Add a few drops of liquid plant food and place on a window sill that receives bright, indirect light. In a few days vigorous algal growth should be noted. As an alternative to local collection, live algal cultures can be purchased at reasonable cost from a number of biological supply houses. Be sure to allow for sufficient time for the cultures to arrive from the commercial supplier.

You will need to bring in consumer products to serve as test liquids (e.g., liquid detergents such as Joy, Ivory Liquid, Dawn or others) in advance.

If you do not use chromatographic paper in the chromatography activity, you may wish to cut up other filter strips in advance, as noted in the activity.

## Teaching strategies

Included in this lesson are two student activities and a student reading with questions.

1. If you wish to complete all the activities, it is suggested that the algal culture activity be set up on the first day of the lesson sequence. This activity has no formal student worksheet. Students can record observations on note paper for later discussion.

Since 1965 Procter & Gamble has spent over one quarter of a billion dollars on environmental safety research. It is no accident that many significant contributions in this field have been made by Procter & Gamble scientists. This activity is intended as a simulation of the environmental fate of various liquid consumer products and liquid solutions of various solid consumer products. It is presented as a teacher-directed activity with no formal student worksheet. You will need 25-35 minutes for the activity and extra time for monitoring the cultures and discussion.

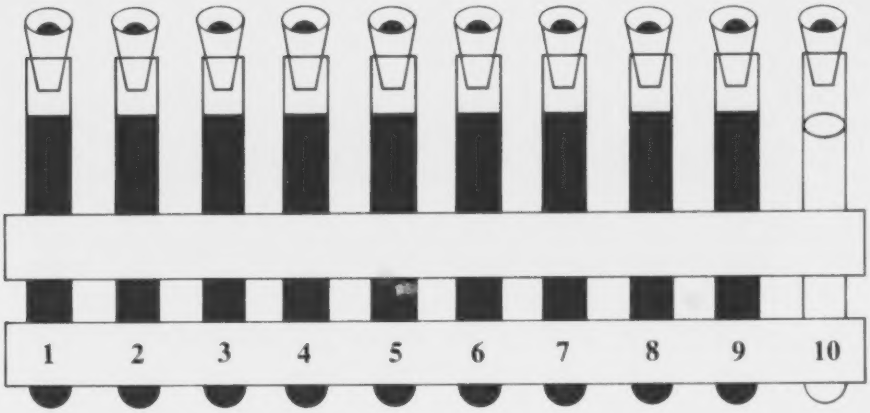
## Materials

per student team of 4:
test tube rack
small test tubes, 10 (some teachers may wish to use 11 tubes and stoppers; see below)
one hole #2 stoppers, 10
eyedropper
1000 ml graduated cylinder
algal culture
detergent (Ivory Liquid, Joy, Dawn or other) dilutions in 1 liter bottles (100,000 ppm, 10,000 ppm, 1 ppb)
masking tape
pencil
pH paper

## Procedure

On the day of the activity, stir the cultures vigorously to distribute algal cells evenly for student sampling. Prepare dilutions of test liquid to use with the activity as follows: Dilute 100 ml of test liquid with 900 ml of water in a one liter bottle to produce a solution with a test liquid concentration of 10% — 1 part in 10, or 100,000 parts per million (ppm). Students will use this to fill test tube 1. Dilute 100 ml of this solution with 900 ml of water in a second one liter bottle to produce a 1% solution (10,000 ppm). Students will use this to fill test tube 2. Continue this procedure to produce 9 dilutions in all. The 9th bottle will have a test liquid concentration of 1 part per billion. You should have sufficient quantities of test liquid solution to supply 5 classes if students work in small groups (3-4 students per group).

Direct each student team to label and arrange 9 small test tubes in a test tube rack. Tubes 1-9 are filled halfway with test liquid solutions in sequence starting with 100,000 ppm in test tube 1. Add an extra tube (#10) with tap water to serve as a control. Some teachers may wish to provide students with a tube of pure test solution (#11). Students should then add an eyedropper of algal suspension to each tube and stopper each tube with a one hole stopper to reduce evaporation (see diagram). Place the test tube rack in a window sill that receives bright, indirect light and observe over a period of time to note algal growth.



Students should routinely observe the cultures and make notes on the viability of various cultures. You may wish to have them keep a record of the pH of the solutions though it is not expected to vary much over the course of the activity.

## Outcomes and discussion

After a period of time (1-2 weeks or longer) have students examine the test tubes and their notes to determine the effects of the test liquid dilutions on algal growth. Visual examination is suggested, although you may have more sophisticated means (spectrophotometer, computer light probeware) for quantitative readings. You may wish to have students make charts or graphs of their results to help them understand and analyze trends over time. Sharing information between classes often helps the students recognize patterns. Students will generally report that sufficiently high test liquid concentrations are inversely correlated with algal growth. At very low test liquid concentrations (1 ppm- 1 ppb), it is likely that little or no effect will be noticed. These are general guidelines. Since many factors affect the outcome of the activity (type of algae, local tap water, variations in nutrient levels, etc.), exact predictions are difficult to make.

In the post lab discussion, have the students compare the growth effects of the various test liquid dilutions to plain water. Ask them why the test tube of plain water is included. (It is a control.) Ask the students to consider whether there seems to be any differences in the viability of algal cultures grown in plain water and those grown in extremely dilute test liquid solutions (ppm or smaller). Most will report that there is no detectable difference at a certain dilution. Ask them what concentrations of test liquid they expect to find in local aquatic ecosystems. (Local environmental concentration levels can vary widely, but are expected to be much lower than 1 ppb!)

You may wish to do this activity as a teacher demonstration for the whole class or as an optional activity for interested students. It may be necessary to reduce the number of test tubes used, especially when conducting this activity with a number of classes. This can be done by assigning each group one or more specific dilution(s) to prepare and combining the test tubes to make a set.

This procedure can be easily modified to test the effects of a variety of substances on algal growth. Of particular interest to students might be liquid plant food, plant growth hormones and various other liquid consumer products. Students may wish to conduct a long-term investigation using this procedure.

2. The student reading should follow the algal culture activity. You may wish to share this

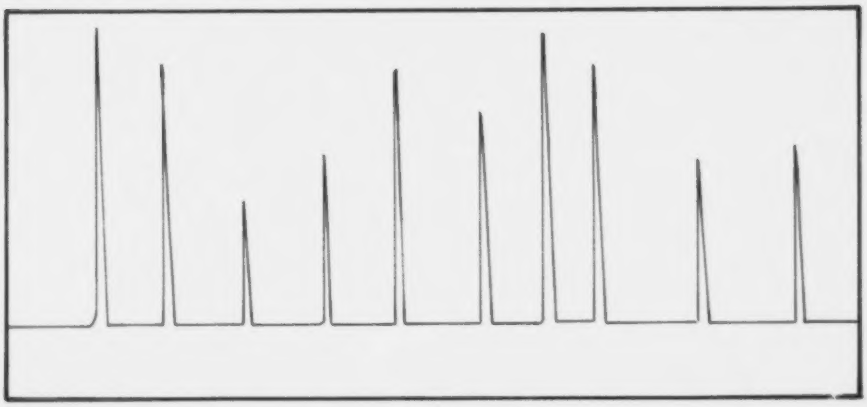
directly with students. You may decide to bring in newspaper articles (or assign students to do this) to give a context for initial discussion. All of us want the convenience and advantages consumer products provide. All of us want a healthy, safe environment. Are these two concepts necessarily mutually exclusive? What is the evidence? Discuss the points of view in the various newspaper articles, asking the students to analyze the point of view of the author.

3. Finally, you may wish to have your students complete the chromatography activity to simulate an analytical method used by Procter & Gamble scientists in environmental safety work. Related ideas and tips for teaching chromatography in the classroom can be found in the September, 1989 issue of Science Scope magazine, published by the National Science Teachers Association. The article was written by staff at the Franklin Institute Science Museum in Philadelphia and includes ready for use student masters.

Chromatography, from the Greek for "color writing," is a method used in analytical chemistry to separate and identify the components of mixtures. Many chromatographic techniques have been developed that meet specific needs. They include column chromatography, thin-layer chromatography, gas chromatography and high performance liquid chromatography, among others. This activity uses paper chromatography to simulate the process of gas chromatography, an important analytical tool.

In paper chromatography, a mixture is separated into its component parts. As water rises up the paper strip, the ink pigments are dissolved. The pigments separate and are carried up the strip until there is too little water to hold them in solution. The pigment molecules then re-attach to the strip. The point at which this happens depends upon a number of factors such as the size of the pigment molecule, its electrical charge and the interaction of forces between the paper, pigment molecule and the liquid. The different bands of color seen on the strips are made of different pigment molecules.

Gas chromatography is used by Procter & Gamble scientists to detect and monitor extremely small concentrations of consumer products in the environment. An inert gas (usually nitrogen, hydrogen, helium or argon) is passed through a heated, coiled tube that is 1 1/2 to 5 meters in length. The column contains a liquid/solid packing material. The mixture to be separated and analyzed is injected into the column and turns immediately into a gas. The various components of the mixture separate and flow along at different rates through the tube. As these components emerge at the end of the tube, they pass through a detector which gives a signal to a recording device. The resulting gas chromatogram is a series of peaks, each characteristic of a particular chemical substance.



The most important component of the gas chromatograph is the detector. Various types have been developed — some of which can detect concentrations approaching parts per trillion (ppt). Others are 100 times more or less sensitive. With this capability, chromatography has become an essential analytical tool, a major part of the effort to determine the environmental fate of various consumer products.

As part of the post-lab discussion, call attention to the two different processes, asking students to describe similarities and differences. You may wish to try other liquids besides water. Alcohol and vinegar make interesting prints. The students may wish to try other dyes or pigments they might find in common items around the home, such as colored candy, various artists' pastels or colored pens. The green pigment in plant leaves can be extracted with alcohol to make prints. Students should seek parent or teacher permission before attempting extension activities.

STUDENT
ACTIVITY

# Paper Chromatography

## Overview

You will use paper chromatography to separate and identify various pigments. You will understand how related techniques can be used to detect and identify very small amounts of chemicals in the environment.

## Time required

One class period

## Materials

per student team of 2-4:
3-4 strips of chromatographic paper, 3/4" x 3 1/2" (can be cut from coffee filter paper)
250 ml beaker or similar container
food coloring or different colored water soluble markers
hand lens
paper clip
toothpicks
tap water

## Safety notes

**Do not bring materials into contact with eyes, mouth or skin. Wash your hands thoroughly after the activity. Wear safety eyewear as directed by your teacher.**

## Procedure

1. Cut several pieces of chromatographic paper about 3 1/2" long. If using filter paper or similar substitute, trim to a finished size of about 3 1/2" x 3/4".

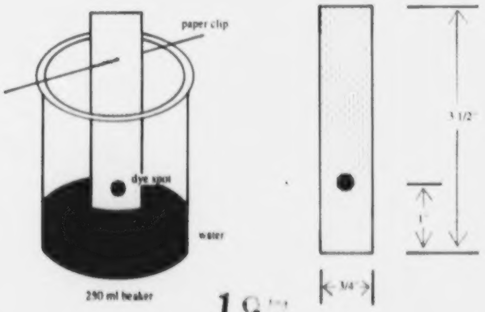
2. Use the flat end of a toothpick to put a drop of food coloring on a piece of chromatographic paper about 1" from the bottom as shown in the drawing.

3. Assemble the other equipment as shown in the drawing.

4. Use enough water to cover just the bottom of the beaker. Lower the paper into place and use a straightened paper clip to poke a small hole in the paper strip. Lower the paper strip into the water.

5. The water will move up the strip, dissolving and carrying the dye spot with it. Try various individual food colors and combinations. Next, try water soluble markers — black works well because it is a mixture of all colors. You will see each different component color separate as the water moves up the strip.

6. Allow the marks almost to reach the paper clip, then remove and allow to dry. Trim the finished prints and save.



## Questions

1. Did you notice this process causes some colors to separate, forming other colors? What is your explanation for this?

2. Why does the water move up the strip? Why does it bring the dye along with it?

3. How is paper chromatography similar to gas chromatography, another analytical procedure used by scientists to detect small residues of chemicals in the environment? How is it different?

# Paper Chromotography

## Suggested answers to questions in the student activity

1. **DID YOU NOTICE THIS PROCESS CAUSES SOME COLORS TO SEPARATE, FORMING OTHER COLORS? WHAT IS YOUR EXPLANATION FOR THIS?**

   *There are only three primary colors--red, yellow and blue. Different combinations of these colors (and white) form other colors. Green food coloring, for example, is composed of blue and yellow. If green is used, students will report separation of the colors after a few minutes. The pigments in black marking pens separate to show all the constituent colors.*

2. **WHY DOES THE WATER MOVE UP THE STRIP? WHY DOES IT BRING THE DYE ALONG WITH IT?**

   *Water moves up the strip because of two forces, cohesion and adhesion. Water molecules form an adhesive bond with the molecules in the fibers of the paper. At the same time, tremendous attractive forces bind the water molecules together so when one is pulled up along the paper fibers, it drags others along with it. Since the dye is water soluble, it is pulled up along with the water molecules. Finally a point is reached when, at the top of the strip, there is not enough water to hold the dye in solution. The dye molecules then adhere to the paper fibers.*

3. **HOW IS PAPER CHROMATOGRAPHY SIMILAR TO GAS CHROMATOGRAPHY, ANOTHER ANALYTICAL PROCEDURE USED BY SCIENTISTS TO DETECT SMALL RESIDUES OF CHEMICALS IN THE ENVIRONMENT? HOW IS IT DIFFERENT?**

   *Gas chromatography separates compounds based on their molecular structure using principles similar to those of paper chromatography. However, gas chromatography uses heated gases to accomplish this separation instead of the various liquids used in paper chromatography.*

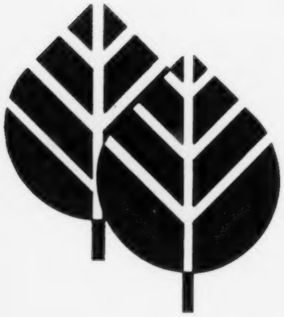
# Environmental Safety

## Research "Beyond the Drain"

"Most things I use in my home eventually go down the drain," is a remark many of us might make. This remark is more accurate than we realize. Many common consumer products, from detergents to cosmetics, will ultimately be washed down the drain. With today's increased awareness comes increased concern for the environment. Just how do we know the consumer products on which we have come to rely are safe for the environment? The Environmental Safety Division of Procter & Gamble has been seeking to provide answers to this question for years. Scientists of many different fields — analytical chemists, chemical engineers, microbiologists and aquatic toxicologists — work to discover the fate of consumer products after they have been used and disposed of "down the drain."

Many of us have come to think of "environmental safety" in terms of safety to a river or stream. Gradually, the term is taking on a new meaning, one much larger in scope. Safety to workers, to the consumer and to the environment are now all included under the larger umbrella of environmental safety. Researchers ask many questions about compounds used in consumer products. Are expected concentrations of products likely to cause problems for the environment? Will the products biodegrade (break down) easily? Are the products of biodegradation also safe? What will be the effects on sewage treatment facilities? Will sensitive animal and plant life be affected?

These questions are not easily answered. Tests on the environment are extremely difficult — chiefly because of the uncertainty in applying the results of a laboratory test to the natural world. In the laboratory, scientists have a great deal of control compared with the level of control possible in nature. Unseasonably heavy rainfall may dilute the concentration of detergent in a stream. The same heavy rainfall may stir up mud or other sediments from the stream bed. This may affect plant and animal life in an unpredictable manner. As if this weren't enough, ecosystems are dynamic — constantly changing in many ways. Chemicals may interact in the environment in different ways than laboratory investigations might have indicated.



The story of chloroflourocarbons (CFCs) paints a picture of the environment as a complex, often unpredictable laboratory. CFCs were first synthesized many years ago by scientists investigating possible substitutes for ammonia, then used in refrigeration. Ammonia can be highly toxic and dangerous under pressure. CFCs have many desirable properties. They are stable (do not degrade under normal conditions), are non-corrosive and non-toxic. They were used in aerosol sprays, in home and industrial refrigeration and automobile air conditioners, and as solvents for various industrial processes, such as cleaning silicon wafers for microchips for personal computers.

As CFC use increased, so did concerns over their possible role in reducing concentrations of atmospheric ozone. A layer of ozone located high in the upper atmosphere, absorbs some of the harmful ultraviolet radiation from the sun. It was suspected that CFCs might interfere with this process. Gradually, enough evidence accumulated to indicate that the "miracle molecules" were depleting the ozone in the upper atmosphere. This came as a complete surprise to scientists who had failed to predict it despite exhaustive screening and testing procedures. The United States has banned certain uses of CFCs, and many U.S. industries plan to phase out much CFC use by the mid-1990s.

Another example involves the use of alkyl benzene sulfonate (ABS). This material is used as a surfactant, or spreader, in some detergents. Laboratory tests indicated no problem with the material. However, in the waste water stream it caused excessive foaming. This foaming was traced to the highly branched, complex chemical structure of the ABS molecules. Later, linear alkyl benzene sulfonates (LABS) were substituted and the foaming ceased to be a problem.

When environmental testing of a Procter & Gamble consumer product is conducted, several separate tests of individual components of a formulation may be performed. For example, if the product to be tested is a synthetic detergent, the surfactant, or "spreader," builder, whiteners and soil suspending agents may all require separate testing. A key determination in any kind of environmental testing involves the prediction of concentration levels in nature and monitoring to make sure these predictions are realized.

A biodegradability test to determine whether living organisms can safely break down larger molecules in the product to smaller molecules requires about 26 days. Over 60% of all testing measures biodegradability in some manner. Of interest to scientists are short-term (acute) and long-term (chronic) toxicity data on various aquatic organisms such as trout, minnows, daphnia (small pond organisms) and algae. These are selected because by studying them scientists can predict how other plants and animals might behave. Other tests of the aquatic environment involve pH, water temperature, dissolved oxygen, dissolved solids and specific ion concentration.
As various consumer products are tested, vital basic information about the environment is discovered. For example, in the 1970s there was concern that phosphates in detergents might lead to uncontrolled growth of algae. This led to several studies of lakes and rivers. Procter & Gamble researchers proved that detergent phosphates could be used by algae. They also proved that other sources of phosphates, including human wastes and fertilizers, could make the algae grow. Since complete environmental safety testing for an important ingredient can cost hundreds of thousands of dollars, scientists are always seeking shorter, less expensive methods that do not sacrifice reliability. One test previously used to measure the long-term effects of detergents involved months of study. A newer version of the test requires just five days. It uses the respiratory rate of bluegills to test the toxicity of heavy metal ions and pesticides.

In other instances, the concern might not be the product itself, but the possible impact of the industrial process required to make the product. Detergent granules for products such as Tide and Oxydol are produced by passing a stream of liquid through a column of heated air several stories tall. As the liquid cools and solidifies, it turns into granules which are then packaged for distribution. The hot air needed for this process is provided by coal-burning furnaces. Virtually all the ash and over 90% of the sulfur is removed from the smokestacks by a combination of scrubbers and electrostatic precipitators.

Various analytical methods, including gas chromatographs, computer models and mathematical techniques are used more often these days by Procter & Gamble researchers. Gas chromatography separates compounds based on their molecular structure — using principles similar to those of paper chromatography, a technique used in many junior and senior high school science classes. However, gas chromatography uses heated gases to accomplish this separation instead of various liquids used in paper chromatography. Computer models are helpful in understanding the complex relationships that exist on the environment. One such computer data base contains information on the flow rate of all major rivers in the United States at selected cities and other points along their banks! Using various computer models with actual field test techniques allows reasonably accurate forecasts of the environmental fate of consumer products.

Procter & Gamble's concern for human and environmental safety matches its concern for the high quality and performance of its products. This concern leads the company to track the environmental fate of these products "beyond the drain." Preserving environmental quality is a corporate responsibility which Procter & Gamble has accepted in the past and will continue to accept in the future.

## Questions

1. What is meant by environmental safety?

2. What kinds of questions do researchers ask about the environmental safety of a material?

3. What are some difficulties involved with environmental safety testing?

4. How does the chloroflourocarbon (CFC) story provide an example of the difficulty of predicting the environmental fate of various chemicals?

5. Why are biodegradability tests so important?

6. Is environmental safety testing inexpensive and easy? Give an example to support your answer.

# Environmental Safety

## Suggested answers to questions in the student activity

1. **WHAT IS MEANT BY ENVIRONMENTAL SAFETY?**

*"Environmental safety" includes issues involving safety to the environment, including animals, plants and the people who live in the environment.*

2. **WHAT KINDS OF QUESTIONS DO RESEARCHERS ASK ABOUT THE ENVIRONMENTAL SAFETY OF A MATERIAL?**

*Are expected concentrations of products likely to cause problems for the environment? Will the products biodegrade (break down) easily? Are the products of biodegradation also safe? What will be the effects on sewage treatment facilities? Will sensitive animal and plant life be affected?*

3. **WHAT ARE SOME DIFFICULTIES INVOLVED WITH ENVIRONMENTAL SAFETY TESTING?**

*Tests to assess the impact of products on the environment are extremely difficult to design and carry out. Much of this difficulty involves applying the results of a laboratory test to the natural world. In the laboratory, for example, all variables may be controlled except the variable under study. In nature, there are many factors over which the scientist has no control. In addition, ecosystems are constantly changing. The challenge is to develop controlled studies that simulate nature.*

4. **HOW DOES THE CHLOROFLOUROCARBON (CFC) STORY PROVIDE AN EXAMPLE OF THE DIFFICULTY OF PREDICTING THE ENVIRONMENTAL FATE OF VARIOUS CHEMICALS?**

*CFCs were tested extensively in laboratories for animal, human and environmental safety before they were used. There was no evidence to indicate the problems they might cause for the ozone layer, located many miles above the surface of the earth. Natural conditions are extremely difficult to simulate in the laboratory; scientific evidence is not inviolate and may not cover all situations that exist in nature.*

5. **WHY ARE BIODEGRADABILITY TESTS SO IMPORTANT?**

*Many of our consumer products will wind up "down the drain," in our garbage cans or in other ways be released into the environment. These tests measure the potential of the environment to cope with dilutions of these materials.*

6. **IS ENVIRONMENTAL SAFETY TESTING INEXPENSIVE AND EASY? GIVE AN EXAMPLE TO SUPPORT YOUR ANSWER.**

*These tests are neither inexpensive nor easy. Specific student answers may vary.*

# Science Glossary

| | |
|---|---|
| **Acute effects** | Effects of short-term exposure. |
| **Biodegradability** | Capable of being broken down. |
| **Chelate** | A compound in which the central atom is attracted by two or more bonds, forming a surrounding structure. |
| **Chromatography** | A method used in analytical chemistry to separate and identify the components of mixtures. |
| **Chronic effects** | Effects of long-term exposure. |
| **Double blind study** | A study in which the identity of the substance being tested is kept secret from both the participants and the researchers. |
| **Ecosystem** | The complex of a community and its environment functioning as an ecological unit in nature. |
| **Frequency and duration of exposure** | How often and how long one is exposed to a substance. |
| **Gingivitis** | Inflammation or swelling of the gum tissue that surrounds the tooth caused by the uncontrolled build-up of placque. |
| **Placque** | A thin coating of bacteria which forms on the teeth. |
| **Precipitate** | A solid substance that forms from liquid solutions. |
| **Route of exposure** | The way a chemical enters the body — through the mouth, the skin or the lungs. |
| **Tartar (or dental calculus)** | A thick and hard deposit on the teeth caused by the gradual build-up of placque over time. |
| **Threshold limit value** | The concentration at which a particular chemical has an effect. |
| **Toxic, toxicity** | Toxic means poisonous. A toxic substance is one which poses a substantial hazard to human health and may cause illness, injury or death. Toxicity refers to the degree to which a substance is poisonous. |

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# Student Worksheet Masters and Wall Charts

STUDENT READING

# The Calcium Connection

The story of Citrus Hill Plus Calcium is a complex one. It's not just a story of adding a few ingredients to orange or grapefruit juice to make a new product. It's the story of a partnership of many people in different jobs making decisions that build upon one another to form a knowledge base which encourages research and innovation and allows new products to come to the market. And it all started with "tattletale gray" clothes!

Procter & Gamble's first calcium research began in the 1960s when the company was looking for a way to make a laundry detergent that would get clothes cleaner and brighter. Calcium and other minerals are the culprits which cause the "tattletale gray" of laundered clothes. Business decision makers and researchers concluded a bright wash could be achieved if a way could be found to keep calcium in the wash water from redepositing on the clean clothes. The research ended in West Germany when a scientist found that a compound called diphosphonate kept calcium solids suspended in water so they would rinse away.

While studies involving calcium research were being conducted on detergents, other scientists at Procter & Gamble were researching the nature of tartar formation on teeth. Their goal was to remove dental tartar from teeth safely without damaging the underlying tooth enamel. Many compounds were tested. One (the "new" diphosphonate) called etidronate formed calcium salts on the teeth, protecting them from further tartar deposits. This calcium study formed the basic for developing Tartar Control Crest toothpaste.

These breakthroughs were just the beginning of the company's calcium research. The potential of diphosphonate seemed substantial and the new knowledge gained from the research encouraged the company's scientists to think about other ways to place calcium where it is needed and keep it from forming where it shouldn't be.

In 1968, Procter & Gamble learned of a two-year-old girl who was critically ill. She had abnormally high levels of calcium in her muscles and it was restricting her breathing. Procter & Gamble was not yet a drug company, but company decision makers thought diphosphonate could help the child. They asked for and received approval from the Food and Drug Administration for the doctor to use the new compound on the child. The child improved remarkably, and with several years of therapy, she was able to lead a normal life. This use led to development of a prescription product the treatment of a skeletal disorder called Paget's disease.

From this diverse research and knowledge about calcium Procter & Gamble developed Citrus Hill Plus Calcium. By combining calcium hydrate or carbonate citric acid and malic acid together, a superior calcium delivery system was created. Studies showed that the calcium in Citrus Hill Plus Calcium was more readily absorbed by the body than from other sources including milk and ordinary calcium supplement pills.

The next step was to make sure this new product did not introduce new risks of medical problems to consumers. All the ingredients included were considered safe and were commonly used in other food products. However, consumers don't expect to find calcium in their orange juice and may not be aware it is in there. To evaluate the safety of the product, the company worked with two groups of scientists. First, a group of company experts — medical doctors, toxicologists, etc. — met and asked as many questions as they could about product safety to make sure all possible safety issues were covered. Then a group of non-Procter & Gamble medical and nutrition experts from all over the country were convened to review the company's plans for the new product, formulas and all the safety data. Only when this group of experts was satisfied that consumers were safe, did the company market Citrus Hill Plus Calcium.

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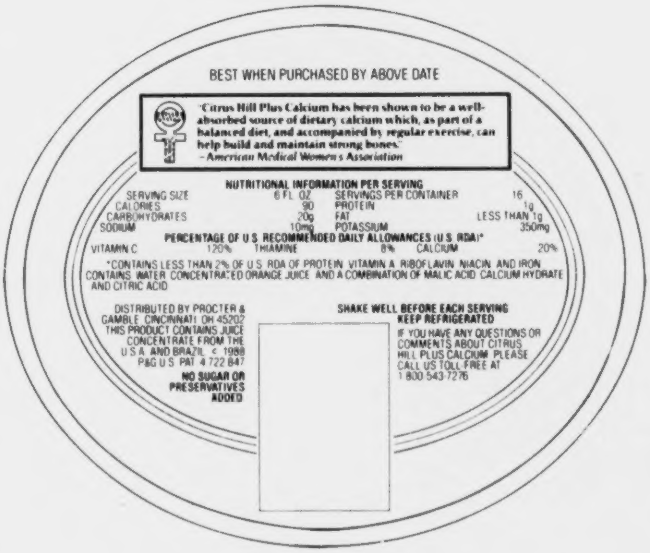
This new juice made by combining regular orange or grapefruit juice with calcium and related compounds is currently helping combat osteoporosis, a disease which accelerates the aging process in which bone mass begins to decrease with loss of bone. This weakens the bones and they become more likely to fracture. Foods rich in calcium can help reduce the suffering this disease can cause and can reduce the number of young people who will acquire this disease when they get older.

From laundry detergent to toothpaste to prescription drugs to orange juice with calcium — as is often the case, it is difficult to end the story of a product's development process. Research continues and what we learn from research on this product will lead other decision makers and scientists to say "There must be a better way," or "The success of this product gives me an idea..."

Orange Juice Beverage–Calcium Fortified–100% Orange Juice
FROM CONCENTRATE
CITRUS® HILL®
Plus Calcium
96 FL OZ
(3 QUARTS)


BEST WHEN PURCHASED BY ABOVE DATE

"Citrus Hill Plus Calcium has been shown to be a well-absorbed source of dietary calcium which, as part of a balanced diet, and accompanied by regular exercise, can help build and maintain strong bones."
– *American Medical Women's Association*

**NUTRITIONAL INFORMATION PER SERVING**

| | | | |
|---|---|---|---|
| SERVING SIZE | 6 FL OZ | SERVINGS PER CONTAINER | 16 |
| CALORIES | 90 | PROTEIN | 1g |
| CARBOHYDRATES | 20g | FAT | LESS THAN 1g |
| SODIUM | 10mg | POTASSIUM | 350mg |

**PERCENTAGE OF U S RECOMMENDED DAILY ALLOWANCES (U S RDA)***

| | | | | | |
|---|---|---|---|---|---|
| VITAMIN C | 120% | THIAMINE | 8% | CALCIUM | 20% |

*CONTAINS LESS THAN 2% OF U S RDA OF PROTEIN VITAMIN A RIBOFLAVIN NIACIN AND IRON
CONTAINS WATER CONCENTRATED ORANGE JUICE AND A COMBINATION OF MALIC ACID CALCIUM HYDRATE AND CITRIC ACID

DISTRIBUTED BY PROCTER & GAMBLE CINCINNATI OH 45202
THIS PRODUCT CONTAINS JUICE CONCENTRATE FROM THE U S A AND BRAZIL © 1988
P&G U S PAT 4 722 847

**NO SUGAR OR PRESERVATIVES ADDED**

**SHAKE WELL BEFORE EACH SERVING**
**KEEP REFRIGERATED**

IF YOU HAVE ANY QUESTIONS OR COMMENTS ABOUT CITRUS HILL PLUS CALCIUM PLEASE CALL US TOLL FREE AT 1 800 543-7276

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STUDENT
ACTIVITY

TO: Risk Management Team
FROM: Product Manager, Liquid Detergent Division
RE: Development of new liquid dishwashing detergent

As you may have heard, the Board of Directors has given the Liquid Detergent Division the green light to develop a new liquid dishwashing detergent. Before the division begins the difficult and costly task of developing this new product, I'm asking your help in alerting us to the potential safety issues and factors we need to consider. I have outlined some general areas to address. Please list as many safety concerns as you can for each of these areas. **Please consider safety to workers, consumers and the environment as you work.** Thank you for your help.

I. **Safety in the Manufacturing Process**

A. Workers' Exposure to Ingredients

B. Selection of Ingredients

C. Shipment of Ingredients

D. Storage of Ingredients

II. **Safety of the Product in Use**

A. Packaging the Product

B. Product Labeling

C. Consumer Contact with the Product -
Exposure to the Product Through Intended Use

D. Exposure to the Product from Accidental
and Non-Recommended Use

III. **Safety of the Product After Use**

A. Disposal of the Product

B. Disposal of the Package

C. Impact on Humans

D. Impact on Environment

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STUDENT READING

# From Development to Disposal --
## Considering Product Safety

In the preceding exercise you were challenged to think about many of the safety issues facing manufacturers of consumer products. Now you will be able to compare the safety issues you identified with those mentioned in this reading. Which did you identify? Which did you mention that are not included in this reading?

We all use consumer products. The decisions we make as consumers when we choose products to purchase are really quite complex. We usually consider things like the product's effectiveness, price convenience, packaging, color, scent, taste and more. If it's a product we have used many times before or which our parents have used, we seldom wonder about whether or not the product is safe. When we think about product safety, it is probably about a particular aspect that is relevant to us in a particular situation. For example, if we get shampoo in our eyes, we might be concerned if it will harm them. Or, if we have a small child at home, we might wonder if a product would be harmful if swallowed.

Although consumers generally may not give much thought to the safety of ordinary household products, an incredible amount of thought has been given to safety by the manufacturers of these products. Making sure products are safe is a primary concern at Procter & Gamble. At every stage of their development, consumer products and their ingredients are subjected to rigid safety assessments. The final decision that a product is safe to market is made only after extensive testing has shown the product to be safe.

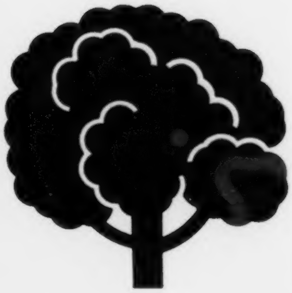
To understand just how involved this process is we must start long before we purchase the product and use it in our homes.

We'll need to start at the manufacturing process. The separate ingredients must be manufactured and shipped to the plant where the final product will be produced. Scientists evaluate the safety considerations of those ingredients during manufacture, shipping and storage. What risk, if any, is there to humans through exposure to the individual ingredients? What risk exists through exposure to the ingredients in combination? Could handling or inhaling the substance during production pose safety risks for the workers? What measures will be taken to control exposure? What risks are posed to the environment? For example, what would be the result if a tank car of an ingredient spilled into a river or if a storage tank ruptured sending fumes into the air? Questions such as these must be answered not only for the ingredient's use during the manufacturing process, but in shipment and storage in warehouses, grocery stockrooms and finally, in consumers' homes.

Yet another aspect of a product's safety evaluation is the package used to hold it. Can the package be used safely? Are there any sharp edges around the opening which could cause cuts? Is it tamper-resistant? Should it have a child-resistant opening? What directions for use should be included on the label? What warnings should be on the label?

Next, the safety of the product in use is considered. Using our example of dishwashing detergent, company toxicologists consider what consumers' exposure will be during use. What effect will the product have when it gets on the consumer's skin during use, or when its scent is inhaled? What risk, if any, arises from eating food on dishes washed with the detergent? Toxicologists also consider what exposure might result from accidental and non-recommended use. What if the product is accidentally ingested or comes in contact with a consumer's eyes? What if a consumer decides to use the detergent as a shampoo or to bathe a pet?

Safety after use is the next consideration. Since dishwashing detergent is generally used with water and is disposed of down the drain, it's important to know what happens after the product is released into the environment. Will it harm fish or wildlife? What about the product's package? What impact does its disposal have on the environment? Can it be recycled? Can it be safely incinerated?



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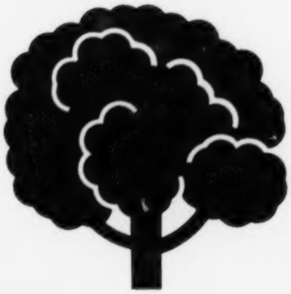
After determining how an ingredient or product might be used or misused and at what concentration people or the environment might be exposed to it, toxicologists choose appropriate tests to obtain needed information. Tests are conducted to determine both short-term and long-term effects of product use to humans and the environment. Tests may include such procedures as the use of bacterial cultures to detect the potential of a chemical to cause cancer. Other tests use cell and tissue cultures. When the safety of an ingredient or product can't be determined by any other methods, tests using animals are required. While companies like Procter & Gamble are committed to searching for alternatives to animal testing, many alternative tests do not predict the effects of chemicals on humans reliably. Procter & Gamble's policy emphasizes using animal testing only when no alternative exists. The company is searching for ways to use fewer animals and to replace animal tests wherever possible with non-animals tests.

If laboratory testing indicates the material is safe, the next step may be testing the product with people. Since the use of a dishwashing product involves regular contact with the skin, tests are designed to evaluate the potential for allergic reaction. This is done with a series of "patch tests" — an exaggerated concentration of the product is applied to the arms of human volunteers. Or, hands may be immersed in a solution of the product or the solution may be rubbed directly onto the skin.

Finally, the product is tested in consumers' homes. Groups of homemakers use the product exclusively for handwashing dishes and a dermatologist examines each person's hands regularly.

Only after all the numerous tests have provided assurance that a product is safe — to humans and to the environment — is the product ready to be marketed.



STUDENT
ACTIVITY

# Invention Evaluation Form

Name________________________________ Date ______________

**Purpose**

To evaluate the inventions, give them a numerical score and cast a second vote.

**Directions**

If the criterion has been fulfilled for the invention being reviewed, place a "Y" in the box next to that criterion.

Add up the total number of "Y"s for each invention.

| | INVENTIONS | | | | |
|---|---|---|---|---|---|
| **CRITERIA** | 1 | 2 | 3 | 4 | 5 |
| High quality product? | | | | | |
| Has a useful purpose? | | | | | |
| Is safe when used as directed? | | | | | |
| Is safe when misused or used by children? | | | | | |
| Can be disposed of easily and safely? | | | | | |
| Is environmentally safe? | | | | | |
| Can be made inexpensively? | | | | | |
| Is legal? | | | | | |
| Will last? | | | | | |
| Is inexpensive to use? | | | | | |
| **TOTALS** | | | | | |

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# Company Employee Roles

---

## Manager, Sales Division

You are in charge of your company's sales personnel. Your goal is to maximize sales by increasing orders from your current customers and by adding new accounts. New or improved products always help your sales volume and your personal income. Your busy schedule calls for a great deal of travel leaving little time for community involvement.

---

## Manager, Research and Development Division

You are in charge of product research and development activities. Your job is to design new products and improve upon existing ones. Product safety is one of your major concerns when developing and improving products. You are in close contact with government agencies involved with safety issues. Educated and trained as a scientist, you are very interested in chemicals and their impact on humans and the environment.

---

## President

You are the president of a large manufacturing company. You are responsible to the board of directors and the stockholders. The company's profits are your first and major concern. Your task is to maintain or increase the profitability of your company.

---

## Toxicologist

You are the chief toxicologist for your company. Your job is to test and evaluate products and their ingredients to determine their safety and effectiveness. You work closely with government agencies such as the Food and Drug Administration. You hold a Ph.D. degree in toxicology and are widely respected in your field. You take great pride in your company's outstanding product safety record.

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## Customer Service Telephone Agent

Your job is to answer the company's toll free telephone line and respond to consumers' complaints and questions. Additionally, you collect and coordinate the information customers give to your company regarding its products. Both positive and negative evaluations of products are made by customers. Consumers also ask questions concerning proper use and improper use of products. Your company uses this information to evaluate products and packaging. You are very aware that if consumers do not like your products they won't continue to buy them. You know from experience if the slightest thing is wrong with a product, consumers will call to comment.

---

## Chief Financial Officer

Your job is to keep track of the financial condition of the company. You monitor departmental budgets and you want to keep costs down so your company can remain competitive. While you recognize the importance of developing new products, you look for ways to reduce spending on research whenever possible.

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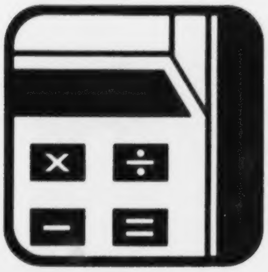

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## Production Employee

You are employed by the company and realize that you have a good job compared with work you could find elsewhere. You are convinced that if you lost your job with the company for any reason, you and your family would have to move to a larger city for employment. Although you do not have much formal education, your hard work has been recognized through promotions and pay raises. Leaving this community would cause great emotional and financial hardship for you and your family.

## Data Entry Clerk

You are new to the company. You are responsible for entering data into a computer for inventory control. This is your first job out of high school. You are engaged to be married and you and your fiance plan to stay in this community and have a family. You are pleased to be working for such a highly respected company and hope you will be able to advance in the organization.

## Co-op Student

You attend a nearby university and are co-oping this semester at the company. You are learning a lot and enjoying your work.. You hope to make a good impression so that after graduation you will be hired as a full time employee. You have been assigned to assist company scientists in evaluating the environmental impact of various packaging materials.

## Public Relations Specialist

You have worked for the company several years. Your main responsibility is to see that the company maintain a good public image. You have initiated a variety of programs to help the community, including educational assistance and a support group of company volunteers to work on a variety of community projects. You are proud that as a result of your programs, the company is generally viewed as a good corporate neighbor. You feel very strongly that the company should do nothing which might jeopardize the positive image you've worked so hard to establish.

# Community Members

### City Council Member

You are an elected official with two years to go in your existing term and plan to run for re-election. The theme of your last successful election campaign was "What's Good for Business is Good for our Community." Your economic development platform promised new jobs and better pay for community residents. You want more businesses to move into your community and the existing businesses to expand operations. You want your community to be known as a "friend of business."

### President of Local Environmental Organization

You are the president of the local branch of a national organization committed to a clean and safe environment. You have worked for many years to make businesses more responsible when it comes to product safety and environmental issues. You believe businesses have a financial and moral commitment to the areas in which they are located and to their consumers.

### Owner of Local Supermarket

As the owner of supermarket you think of the success of your business first. You have worked hard to watch your small grocery store grow into a large retail market. Recently your concern about product safety has been growing. You have heard reports of product tampering in other areas and wonder how you will maintain the safety of your merchandise. The cost of improved packaging might have a negative impact on your sales. Many of your customers work for the local manufacturing company.

### Editor of the Local Newspaper

As editor you feel a civic duty to express your point of view on the major issues of the day. Product safety and environmental issues top the list of local concerns. You are a strong believer in preserving the Earth for future generations. You have written several blistering editorials on the responsibility of business to maintain a healthy environment. When it comes to product safety, you have led the charge for reform in the use of cautionary labels.

### President of the Local Retail Merchants' Association

In this role you represent over fifty owners of local businesses. You realize that your community's economic well-being depends on the profitability of the local manufacturing company. You remember that several years ago widespread layoffs hit the company. Community merchants fell on hard times. Several, in fact, had to close, while almost all had to fire many of their workers. While you are concerned about environmental issues and the growth of your community, you are well aware that a decline at the local manufacturing plant could spell disaster for your community's economy.

### Retired Person

You are seventy years old, the former owner of a small retail business. You are in very good health and spend much of your time outdoors engaging in leisure activities you never had time for while working. While you were in business, you always felt compelled to be an active member of the community. You still feel this way — local businesses have a responsibility to the community in which they are located.

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### Doctor at the local Medical Center

As a medical doctor, your first responsibility is to your patients. Like most medical professionals you have a concern for product safety and for environmental issues. You have heard that there might be some product safety and environmental issues surfacing that involve the local manufacturing company—your community's major employer. Remember, your first commitment is to health and safety.

### High School Student I

You are sixteen. You have studied about environmental issues both in science and in social studies classes. You are involved in a Student Action group which is planning a write-in campaign to your community's government to encourage them to begin a recycling program. You want to try to make a difference in your community. You plan to attend college and perhaps, eventually, run for public office.

### Homemaker

You have been married three years. You left your job to stay at home and care for your newborn baby. Your spouse works for the company. You spend what time you can doing volunteer work in the community. You are a member of the local environmental organization and also a consumer activist organization.

### High School Student II

You are eighteen and will graduate this year. You have worked at the local fast food restaurant for the last two years. You hope to get a job in a local print shop following graduation. You are aware that about 75 percent of the print shop's business is generated by the company. Both your mother and an uncle work for the company.

STUDENT
ACTIVITY

# Issues and Concerns

## ISSUE/CONCERN #1

The company is currently thinking about changing a major ingredient in one of its most popular household cleaning products. The new ingredient is cheaper to produce and its toxicity is at or below the level of the present ingredient. Use of the new ingredient would prove profitable for the company. The company could lower the price of the item, increase sales and increase profits or hold the price constant and earn more profit per unit sold.

Company scientists warn, however, that although the new ingredient has passed all safety requirements, they are still concerned with the long-term health effects of this proposed new product. What should the company do?

## ISSUE/CONCERN #2

Currently the company's operations are threatening the air quality of the local community. There is an 80% probability that an expenditure of two million dollars will eliminate the risk. If the two million is spent, the result will probably be a cutback in new product development. This may also mean a reduction in staff of approximately fifty jobs. Do you support the two million dollars expenditure?

## ISSUE/CONCERN #3

Your competitors' products have been tampered with. This has resulted in serious injury to a few consumers. Do you redesign and repackage your products using a tamper-resistant container? The cost of repackaging will either reduce your profits or raise the price of your products above that of your competition.

## ISSUE/CONCERN #4

In a cost reduction effort to increase dividends for your stockholders, you contemplate reducing your customer service department. The savings are substantial.

## ISSUE/CONCERN #5

Your research and development group has just invented a new drug that seems to cure a deadly disease. Few people contract the disease but when they do they usually die. The drug will not be made available in the United States for years because of the need for more testing and government agency approval. The cost of continuing the testing and development effort will be in the millions of dollars. Do you continue the product development effort?

## ISSUE/CONCERN #6

A person using your product failed to follow the directions carefully and caused herself physical discomfort. She called the customer service department and voiced her concern. She said the directions were not clear and she didn't realize she could hurt herself with your product if misused. Do you remove all of the products from the market? Should you place more explicit instructions in and on the boxes? The cost for changing the label is one million dollars.

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# Issues and Concerns - Real Cases

## ISSUE/CONCERN # 7

Your company produces a granular automatic dishwasher detergent. You decide to introduce a liquid version of your product. For the product to work effectively, it must contain an ingredient which has the potential of being harmful if ingested. You have reduced this possibility by making the product emetic — that is, it will cause anyone who swallows it to vomit before enough can be ingested to cause harm. However, the liquid form makes it easier to swallow than granules, so there is a slight chance a child could swallow enough to cause harm. You know that dishwashing products are often stored under the kitchen sink within easy reach of children.

### Option 1

Rely on your safety testing and the emetic qualities of the product. The chances of harm occurring are slim. No other manufacturer of liquid dishwashing detergents offers any additional protection.

### Option 2

Market the product with a child-resistant cap. You know that a number of consumers will find this inconvenient. However, you feel even though the potential danger is slight, it is worth causing some inconvenience to reduce the risk even further.

### Option 3

Produce a product which contains no ingredients which would be harmful if ingested. Such a product would not be as effective in cleaning dishes and hence would probably not sell well. However, you would have a product that is both safe and convenient to use.

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## ISSUE/ CONCERN # 8

Your company produces a wide variety of laundry detergents. All of your products are scented. Years of consumer research has indicated the majority of consumers prefer scented products for washing their laundry. Further, your scented products have been thoroughly tested to make sure they are safe for the skin. You have heard some consumers complain that they are sensitive to scented detergents and express a wish for a perfume free and dye free laundering product. However, you feel sure the number of people actually sensitive to scented laundry detergent is too small to warrant the cost of producing a new product to meet this need. You have years of experience which supports the position that only a product which has mass appeal can create enough profits to justify producing it. Should you produce a perfume free, dye free detergent?

### Option 1

Create a perfume and dye free product designed to leave no residue on fabrics and test it in limited markets. If it meets consumers needs and earns a profit, consider producing it for the national market even though the total volume is not as large as one of your leading brands.

### Option 2

Launch a massive advertising and public relations campaign stressing the safety of current scented products.

### Option 3

Rely on history and experience and stick with what has worked in the past. Since the majority of consumers prefer scented products and products that have wide appeal create more profits, continuing to market only the detergents you currently produce will make sufficient profits without risking the high cost of producing and promoting a new brand.

## ISSUE/CONCERN # 9

Your company sells liquid fabric softener in West Germany. Germany is a densely populated country and the population has a strong interest in environmental concerns. Fabric softeners have become a target of environmental groups because their big plastic bottles are very visible in the garbage. Additionally, in Germany people must rent garbage cans from the city and the larger the can the more it costs. Empty fabric softener bottles take up considerable space in the garbage cans. People concerned with the environment and with the cost of waste disposal have stopped buying liquid fabric softeners and your sales volume and profits have dropped significantly. What do you do?

### Option 1

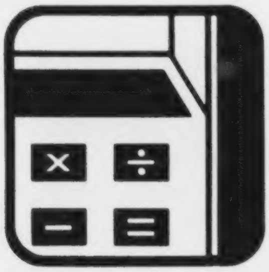
Accept the fact that sales of this product will probably continue to fall. Raising prices may help in reducing your losses.

### Option 2

Launch a publicity campaign to confront the environmentalists. You know the products you sell are safe and that your company has invested millions in research to make sure its products are compatible with the environment.

### Option 3

Look for an innovative way to enable consumers to continue to purchase and use liquid fabric softeners without contributing so much to solid waste.



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## ISSUE/CONCERN #10

Your company is committed to producing products which are safe for humans and the environment when they are used as intended and even for foreseeable misuse (for example, if accidentally swallowed or splashed in the eyes). Scientists and government leaders agree that it is not possible today to provide adequate safety and efficacy assurance without animal research. In fact, there are government requirements for safety assurance based on animal test data. There is widespread public concern about using animals for research. Some animal rights organizations are calling for a complete halt to animal testing. You care deeply about animal welfare, but want to be certain the products you sell are safe for consumers.

### Option 1

Eliminate all animal testing. This will considerably limit your ability to develop new products. You will only be able to use ingredients which previously have been found to be safe. Or, if you do use new ingredients or combinations of ingredients you will be compromising the safety of your products.

### Option 2

Ignore the issue entirely and continue to use animals in research as you have in the past. This way you know your products will be safe.

### Option 3

Are there other alternatives? Is there a way to balance the need for products which are safe for humans with the concerns of those who feel animals should not be used in research? What would you do?

STUDENT
WORKSHEET

# Criteria and Evaluation Sheet

**ISSUE #** ____________

**Description** ____________________________________________

**Decision** ____________________________________________

| **Criteria** | **Evaluation Score** |
|---|---|
| 1 ____________ | ______ |
| 2 ____________ | ______ |
| 3 ____________ | ______ |
| 4 ____________ | ______ |
| 5 ____________ | ______ |
| 6 ____________ | ______ |
| 7 ____________ | ______ |
| 8 ____________ | ______ |
| Total | |

**ISSUE #** ____________

**Description** ____________________________________________

**Decision** ____________________________________________

| **Criteria** | **Evaluation Score** |
|---|---|
| 1 ____________ | ______ |
| 2 ____________ | ______ |
| 3 ____________ | ______ |
| 4 ____________ | ______ |
| 5 ____________ | ______ |
| 6 ____________ | ______ |
| 7 ____________ | ______ |
| 8 ____________ | ______ |
| Total | |

**Evaluation Scale**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Totally Unacceptable | Somewhat Unacceptable | Neither Unacceptable or Acceptable | Somewhat Acceptable | Completely Acceptable |

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STUDENT
ACTIVITY

# Decision Diary

## Activity Sheet

Name ______________________ Date ______________

**Purpose**

To identify the number and importance of the decisions you have made lately.
To practice making decisions.

**Directions**

Complete the following questions as accurately as possible.

1. Complete the statement: "I am concerned about my safety and the safety of others because.......

2. Check the appropriate box:

| TODAY | YES | NO |
|---|---|---|
| I brushed my teeth | ☐ | ☐ |
| I checked my tires before driving | ☐ | ☐ |
| I used a ground fault outlet for my hair dryer or curling iron | ☐ | ☐ |
| I fastened my seat belt | ☐ | ☐ |
| I looked both ways when crossing the street | ☐ | ☐ |
| I hired a bodyguard | ☐ | ☐ |
| I read the label on the mouthwash | ☐ | ☐ |
| I picked a fight with a person twice my size | ☐ | ☐ |
| I smoked a cigarette | ☐ | ☐ |
| I rode a bicycle or motorcycle without a helmet | ☐ | ☐ |
| I wore a hat and clothing which would protect my skin from the sun | ☐ | ☐ |

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3. The following activities are generally considered to be safe activities. Identify (if you can) when these activities may be hazardous to your health.

   Eating

   Jogging

   Taking a walk

   Dancing

   Sleeping

   Driving a car

   Riding a bicycle

   Kissing

4. List five decisions you have made in the last week that have had benefits and costs.

STUDENT
BACKGROUND
READING AND
ACTIVITY

# Suds

## A Soap and Detergent Case Study

### Purpose

To describe the number and complexity of decisions made to produce soaps and detergents.

### Directions

Answer the questions found in the case study on a separate sheet of paper.

Often we take for granted the activities and products we are involved with every day. They become so commonplace we forget to think about them. Such is the case with soap and detergent. We will all agree soaps and detergents are important. We bath, wash our hair, launder our clothes, clean our dishes and most of our material goods with them. Truly, without "suds" our world would be a dirty place.

**LIST THE ITEMS YOU HAVE AT HOME WHICH CONTAIN SOAP OR DETERGENT.**

It is estimated that all Americans come in contact with soaps and detergents, directly or indirectly, several million times a day. With this level of exposure, it's no wonder the producers of soaps and detergents are very concerned about the safety of their products. The safety issue is addressed early and often. At every stage of production, marketing and usage, the products are subjected to safety evaluations. Decisions regarding what ingredients to use, what directions and cautions to put on the package and how to dispose of the package properly are some of the issues requiring decisions.

**WHAT MIGHT HAPPEN TO THE USER, THE BUSINESS AND THE ENVIRONMENT IF A COMPANY PRODUCED A PRODUCT THAT WAS NOT SAFE BOTH IN THE SHORT AND THE LONG-TERM?**

To producers safe means safe to humans, safe to the environment and safe to materials with which the product will come into contact. This seems like a long list, but it's only the beginning. The following lists the specific groups influenced by safety decisions:

**Safety to humans:**

- The people who make the product
- The consumers who use the product
- The consumers who misuse the product, accidentally or intentionally
- The consumers who come in contact with the product after use or disposal

**Safety to the environment as a result of manufacture, use and disposal:**

- To sewage disposal systems
- To bodies of water
- To aquatic fish and plants
- To food crops
- To animals

**Safety to materials with which the product comes in contact:**

- Laundry appliances
- Fibers, fabrics, dyes, plastics and finishes

In every stage of the development cycle the safety concerns for all of these areas must take place. This includes the product's design, the factor input decisions, the method of production choices, selecting a package, writing directions for use and suggesting proper disposal.

The Procter & Gamble Company employs over 500 people who are directly involved in product safety issues. Because the company is very safety conscious, many more people are indirectly involved in the process.

**WHAT ARE THE COSTS AND BENEFITS TO THE COMPANY OF HIRING PRODUCT SAFETY PROFESSIONALS?**

Specifically, the testing program employed by companies like Procter &

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Gamble includes the product's effects on human beings caused by:

- Exposure to products or their ingredients resulting from regular use
- Known possibilities of accidental misuse

Tests of this kind often require the use of computer modeling and when necessary animal tests. Although companies are attempting to reduce animal tests, sometimes such tests are required by regulatory agencies or are the best or only way to make sure the product is safe. Government leaders and scientists agree that it is not possible today to provide adequate safety and efficacy assurance without animal research. Procter & Gamble, for example, uses animal testing primarily for the development of regulated food and drug products, and has reduced its use of animals in testing of household and personal care products over 80% in the last five years. The company is a recognized leader in the ongoing search for alternative test methods.

**WHEN WOULD YOU RECOMMEND USING ANIMALS FOR TESTING?**

Finally, tests take place under the actual conditions the product would be used in the home. People are selected and their use of the product is monitored so the effects of long-term use of the "SUDS" in the real home environment can be evaluated.

**DO YOU CONSIDER PRODUCT SAFETY IMPORTANT? REVIEW THE DECISIONS BUSINESSES MAKE TO MAKE "SUDS" SAFE. DISCUSS IF THE COSTS ARE WORTH IT. SUPPORT YOUR OPINION.**

STUDENT
BACKGROUND
READING AND
ACTIVITY

# Solid Waste Fact Sheet

## An Analysis of Data

### Purpose

To acquire more knowledge about solid waste and use the information to develop a solid waste plan.

### Directions

Read the information carefully. Complete the activities and answer the questions found in the reading.

Garbage is rapidly becoming the topic of discussion in business meetings, political conventions and even at the dinner table. Americans now place adequate garbage disposal third on a list of major local problems. No wonder, when every person in the United States produces 3.5 pounds of garbage per day. That's 160 million tons per year, enough to fill 2,700 football fields with a layer of garbage ten stories high! Although estimates vary, all researchers agree that solid waste totals are growing and they are estimated to grow more.

**MONITOR THE SOLID WASTE YOU GENERATE IN ONE DAY. KEEP A RECORD OF THE ITEMS YOU THROW IN THE GARBAGE AT HOME, AT SCHOOL AND AT RESTAURANTS. RECORD YOUR FINDINGS AND BE PREPARED TO SHARE YOUR FINDINGS IN GROUP AND CLASS DISCUSSIONS.**

It is estimated that packaging and container waste makes up 30% of our discards, another 25% is nondurables such as newspapers and old clothing. Twenty per cent is yard waste, 14% is durable goods such as appliances and tires and 9% is food waste. The remaining 2% is miscellaneous inorganic wastes. The production of safe products requires products to be adequately packaged, but decisions must be made in the solid waste area that will protect the total environment for the protection of all living things. To better understand our garbage, review the chart which follows:

### WHAT'S IN OUR GARBAGE?

| Amount (1986 data) | Millions of tons | % |
|---|---|---|
| Paper and paperboard | 64.7 | 41.0 |
| Glass | 12.9 | 8.2 |
| Metals | 13.7 | 8.7 |
| Plastics | 10.3 | 6.5 |
| Rubber and leather | 4.0 | 2.5 |
| Textiles | 2.8 | 1.8 |
| Wood | 5.8 | 3.7 |
| Food wastes | 12.5 | 7.9 |
| Yard wastes | 28.3 | 17.9 |
| Other | 2.7 | 1.7 |
| Total | 157.7 | 100.0 |

Source: Characterization of Municipal Solid Waste in the United States, 1960 to 2000; Franklin Associates, Ltd., 1988.

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### HOW DOES YOUR GARBAGE COMPARE WITH THE NATIONAL AVERAGE?

The problem of dealing with our solid waste must be addressed and rapidly. Fewer and fewer solid waste facilities exist to store an ever growing amount of material. Like so many societal problems, waste disposal seems at first glance to be too large to have a solution. This is simply not true. Decisions can be made to solve the problem or at least to reduce its negative effects. To help you begin to realize the problem may have a solution, review the following chart:

### GARBAGE AROUND THE WORLD

Per capita lbs/day

| | |
|---|---|
| Los Angeles | 6.4 |
| Philadelphia | 5.8 |
| Chicago | 5.0 |
| New York | 4.0 |
| Tokyo | 3.0 |
| Paris | 2.4 |
| Toronto | 2.4 |
| Hamburg (W.Germany) | 1.9 |
| Rome | 1.5 |

Source: National Solid Wastes Management Association, 1989.

**DOES EVERY CITY AROUND THE WORLD HAVE THE SAME LEVEL OF SOLID WASTE GENERATION? WHY DO YOU THINK LOS ANGELES HAS SO MUCH MORE THAN ROME? HOW DOES YOUR FAMILY COMPARE WITH THE CITIES LISTED?**

Currently, our nation deposits 83% of its solid waste in landfills, 11% is recycled and 6% is burned to generate energy.

**FIND OUT WHERE YOUR COMMUNITY DUMPS ITS SOLID WASTE.
DOES YOUR COMMUNITY HAVE A WASTE-TO-ENERGY FACILITY?
WHERE IS YOUR NEAREST RECYCLING CENTER?**

Landfills will not continue to be a viable solution for the bulk of our solid waste. Of the 6000 landfills operating in this country in 1988, 200 will close by 1993 causing an overall capacity loss of 56 million tons. This relative shortage of landfill space is causing the price charged to dump (tipping fees) to rise. Review the following chart to determine the tipping fee in your area:

## TIPPING FEES BY SELECTED STATES

| | $/TON | | $/TON |
|---|---|---|---|
| Alabama | $ 10.75 | Minnesota | $ 40.06 |
| Arkansas | 6.75 | Missouri | 13.00 |
| California | 10.00 | Nebraska | 8.00 |
| Colorado | 10.50 | Nevada | 6.00 |
| Connecticut | 35.00 | New Jersey | 41.97 |
| Delaware | 24.82 | New York | 40.00 |
| District of Columbia | 14.00 | North Dakota | 9.00 |
| Florida | 27.40 | Ohio | 15.51 |
| Georgia | 13.50 | Oklahoma | 12.75 |
| Hawaii | 13.00 | Pennsylvania | 25.00 |
| Illinois | 14.70 | Rhode Island | 49.00 |
| Indiana | 15.15 | South Carolina | 4.75 |
| Kansas | 4.07 | Tennessee | 7.50 |
| Louisiana | 9.75 | Texas | 9.35 |
| Maryland | 40.00 | Virginia | 24.00 |
| Massachusetts | 65.00 | Washington | 42.00 |
| Michigan | 26.00 | Wisconsin | 14.25 |

Source: National Solid Wastes Management Association, 1988.

**WHY DO YOU THINK THE TIPPING FEES VARY SO MUCH BY STATE? WHAT IS THE TIPPING FEE IN YOUR AREA?**

New landfills are difficult to start because of the "NIMBY" situation and environmental concerns. And, it is estimated that an environmentally safe landfill will cost 89 million dollars for a 100 acre facility. This price includes special holding basins, leaching fields and the cost of returning the area to a pleasant and safe place for humans and animals.

**GIVEN THE COST ESTIMATES AND YOUR KNOWLEDGE OF ECONOMICS, WHAT MUST HAPPEN FOR BUSINESSES TO BUILD NEW LANDFILLS?**

Before our discussion continues, one issue must be addressed. It is that of litter. Many people think the litter problem and the solid waste problem are the same. For the most part, they are not. Litter is the careless or incorrect disposal of wrappers, soft drink cans, convenience food containers, etc.. The act of littering forces other people to bear the cost of an unsightly environment, annoying insects and hiring someone to pick up the litter. Solutions to this problem may be consistent with the solid waste solutions, but it is naive to think solving the litter issue will solve the solid waste problem.

**DID YOU SEE LITTER ON YOUR WAY TO SCHOOL TODAY? DID YOU LITTER? IF SO, WHY DID YOU CHOOSE TO, AND IF NOT, WHY WAS THAT DECISION MADE?**

One solution that has been suggested to the litter issue is the creation of degradable packages, that is, packages made from material which will break down into simpler materials through exposure to natural forces such as bacteria or light.

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Because litter is often exposed to the elements, using degradable packaging sounds like a useful solution. However, degradable packaging will not help the solid waste problem because landfills protect the garbage from the very elements that foster decomposition by covering it with layers of soil. In other words, whether a material is biodegradable or not, when it's put in a landfill not much biodegradation occurs. It should be noted too, that businesses have to consider more than the litter and solid waste issues when designing packages. Durability, freshness and safety must be considered as well.

**WHY DOESN'T CREATING DEGRADABLE PACKAGES HELP THE SOLID WASTE PROBLEM?**

The solid waste problem does not have an easy or single solution. Currently, comprehensive waste management plans include source reduction, recycling and composting, waste-to-energy incineration and environmentally safe landfills.

Source reduction refers to changing both product and packaging to reduce the weight and volume of solid waste. Procter & Gamble, for example, created their new Pampers and Luvs disposable diapers with an absorbent gel core which reduced their volume by 50 percent. Similarly, package volume was reduced by 80% by replacing cardboard cartons with plastic poly-bags. The company's decision makers realize the solid waste problem is real, and are committed to reducing and better disposing of solid waste. Successful companies of the future will be those which meet consumers' demand for "environmentally smart" products and packages. This is why many companies are currently researching new and better ways to produce and package their products.

**WHY ARE COMPANIES CONCERNED ABOUT THE SOLID WASTE PROBLEM? WHAT OTHER ISSUES MUST COMPANIES BE CONCERNED ABOUT WHEN DEVELOPING A NEW PRODUCT OR MODIFYING AN OLD ONE?**

Recycling plays an important role in solving the solid waste problem. Review the following chart:

### RECYCLING

| | **Amount Generated (mill. of tons)** | **Amount Recycled (mill. of tons)** | **% of Total waste Recycled** |
|---|---|---|---|
| Paper and paperboard | 64.7 | 14.6 | 9.2 |
| Glass | 12.9 | 1.1 | 0.7 |
| Metals | 13.7 | 1.0 | 0.6 |
| Plastics | 10.3 | 0.1 | 0.1 |
| Rubber and leather | 4.0 | 0.1 | 0.1 |
| Textiles | 2.8 | 0.0 | 0.0 |
| Wood | 5.8 | 0.0 | 0.0 |
| Food wastes | 12.5 | 0.0 | 0.0 |
| Yard wastes | 28.3 | 0.0 | 0.0 |
| Other | 2.7 | 0.0 | 0.0 |
| Total | 157.7 | 16.9 | 10.7 |

Source: Characterization of Municipal Solid Waste in the United States, 1960 to 2000; Franklin Associates, Ltd., 1988.

STUDENT
BACKGROUND
READING AND
ACTIVITY

Essentially all reclaimable materials can be recycled. Technologies exist to process paper, glass, most metals and all types of plastics into useful new products. The economic advantages are obvious — new products and new markets, plus, materials that are recycled don't end up in the waste stream, thus reducing the burden to landfills and the resulting expense.

## WHAT INDIVIDUAL, COMMUNITY AND BUSINESS INCENTIVES ARE NECESSARY FOR A RECYCLING PLAN TO GROW AND BE SUCCESSFUL?

It is estimated that by the year 2000 17% of our solid waste will be burned to generate energy. This is an 11% increase from the waste-to-energy incineration currently being done. Although according to the Environmental Protection Agency, a waste-to-energy system should be considered as a preferred alternative to landfills, there are some concerns with this method of disposing of solid waste. One concern is air pollution. The generation of pollutants and their release into the air is now being effectively reduced or prevented by the air pollution devices built into modern day waste-to-energy facilities. Another concern is disposal of ash which is left with toxins that don't burn. When these ashes are buried, special care must be taken to prevent toxins from leaching into groundwater.

## WHERE IS THE BEST PLACE TO LOCATE A GARBAGE WASTE-TO-ENERGY FACILITY?

Deciding what should be done to solve the solid waste problem requires a set of complex decisions which require assessing risks and weighing costs and benefits for society, the community and the individual now and in the future.

## DESIGN A SOLID WASTE MANAGEMENT PLAN FOR YOUR COMMUNITY.

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STUDENT
READING

# Household Chemicals

What do you picture when you hear the term chemical? Do you think of an overturned truck spilling chemicals? Vitamin C in orange juice? Factories dumping toxic wastes? Lifesaving medicines?

Let's define some terms:

**Chemical** - All matter is composed of chemical elements. Chemicals may be pure substances such as iron or oxygen. Most chemicals are compounds or combinations of elements. For example, water is composed of hydrogen and oxygen and sugar is composed of three elements — carbon, hydrogen and oxygen.

We are surrounded by chemicals. Our food, water, clothing and even our bodies are all composed of chemicals. Some chemicals are natural, meaning they are found in nature. Man-made or synthetic chemicals are new combinations of elements not found in nature.

When we are tempted to think of the good old days when life was "simple," we may forget the drudgery involved in household work. Chemicals have improved the quality of our lives. We eat better, enjoy high tech products, and live longer as a result of advances in chemistry.

**Hazardous chemical** - A hazardous chemical is a substance that may cause substantial illness or injury to people or the environment. The average home contains between three and ten gallons of materials that are classified as hazardous.

Classifications of hazardous materials include:

**Corrosive** chemicals are capable of dissolving or wearing away gradually, especially by chemical action. Most corrosive materials are potentially dangerous to the skin, and may cause severe burns on contact. They can burn eyes as well. Examples include drain cleaners and oven cleaners.

**Flammable** chemicals pose a fire hazard during routine handling. Examples include kerosene, gasoline and matches.

**Reactive** chemicals tend to react spontaneously or vigorously with air or water, are unstable to shock or heat, generate toxic gases or explode. An example is the toxic gas which forms when chlorine bleach is mixed with lye or ammonia.

**Toxic** means poisonous. Toxic materials pose a substantial hazard to human health and may cause illness, injury or death. Toxic chemicals may be harmful if they are swallowed, if they are absorbed through the skin or if their fumes or vapors are inhaled. Examples of toxic chemicals include pesticides, many toilet bowl cleaners and antifreeze.

Household chemicals are those chemical products used around the home and include medicines, personal care products, detergents, household cleansers, paint products and pesticides.

The term "toxicity" refers to the degree to which a substance is poisonous. Most of us would agree that foods generally are not toxic. Oils, polishes and household bleaches are classified as moderately toxic. Most toilet bowl cleaners, paintbrush cleaners and deodorizers are very toxic. Pesticides, insecticides and mercury cell batteries are extremely toxic. A taste of some pesticides is lethal.

A poison is defined as a substance which has a lethal dose of 50 mg or less per kilogram of body weight. This is about 3/4 of a teaspoon for adults and about 1/8 teaspoon for a two-year-old child. Very few chemicals are lethal in such small quantities.

**EVERY CHEMICAL IN THE HOME HAS THE POTENTIAL OF HARMING HUMANS IF USED INCORRECTLY. IT IS OUR RESPONSIBILITY TO LEARN TO USE CHEMICALS WISELY SO THAT THEIR BENEFITS OUTWEIGH RISKS.**

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## QUESTIONS

1. Describe corrosive chemicals. Give an example.

2. What type of chemical poses a fire hazard during routine handling?

3. What are reactive chemicals? Give an example.

4. Define poison.

5. The reading concludes with the statement that every chemical in the home has the potential of harming humans if used incorrectly. Explain this statement.

STUDENT
READING

# What The Label Must Tell You

In the 1960s, the Federal Hazardous Substance Act was signed into law in an effort to protect consumers from hazardous consumer products. The Act, now administered by the Consumer Product Safety Commission, provides for the labeling of all products that are, or contain, a hazardous substance.

Information required on these labels include:

1. A signal word: **DANGER** on products which are extremely flammable, corrosive or highly toxic, and **WARNING** or **CAUTION** on all other hazardous substances required to bear a label.

2. The additional word **POISON** and the skull and crossbones symbol on highly toxic and other specifically named substances.

3. A description of the principal hazards involved in using the products such as **VAPOR HARMFUL, FLAMMABLE,** etc.

4. A statement of measures the user should take to avoid the hazard such as **USE ONLY IN A WELL-VENTILATED AREA.**

5. A list of the common names of the hazardous ingredients. If a hazardous substance has no common name, the chemical name will be used.

6. If necessary, instructions for **SAFE HANDLING** and **STORAGE.**

7. **FIRST AID** instructions.

8. Name and location of the **MANUFACTURER, DISTRIBUTOR** or **REPACKER.**

9. The statement **KEEP OUT OF THE REACH OF CHILDREN** or its equivalent.

10. Any additional information the Commission finds necessary to protect the public health.

In addition, the Poison Prevention Packaging Act (PPPA) provides the authority to establish child-resistant packaging standards to restrict children's access to certain products such as furniture polish, aspirin, turpentine and paint solvents. The PPPA is also administered by the Consumer Product Safety Commission.

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ACTIVITY

# Comparison of Product Labels and Instructions

| PRODUCT | LIST CHANGES IN DIRECTIONS AND SAFETY INSTRUCTIONS FROM EARLY TO CURRENT LABEL COPY OR INSTRUCTIONS | |
|---|---|---|
| **Comet** | 1963 | 1986 |
| **Spic and Span** | 1945 | 1986 |
| **Lilt** | 1958 | 1988 |

**ANALYZE CHANGES IN TERMS OF PRODUCT SAFETY. FOR THE CURRENT SET OF LABELS:**

1. Are there more or fewer instructions related to product safety?

2. Are there more or fewer graphics or pictures?

3. Are the instructions simpler or more complex?

4. Is the print size smaller or larger?

5. Why do you think Procter & Gamble made these changes?

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1988

**Lilt**

# Perming Instructions

## READ THESE INSTRUCTIONS COMPLETELY BEFORE PERMING

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## 1 Gather Your Materials

- Plastic Rattail Comb
- Scissors
- Clock or Timer
- Shampoo
- Towels (Bath Size)
- Petroleum Jelly
- Plastic Perm Rods - USE AT LEAST 30 FOR BODY, 40 FOR WAVES, 50 FOR CURLS
- Plastic Coated Clips or Bobby Pins

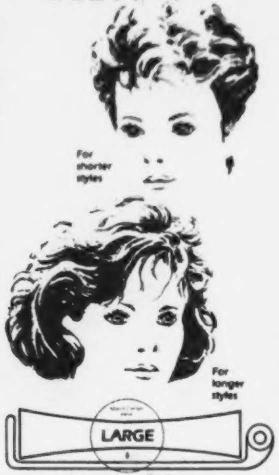
Your kit contains:

- Waving Lotion
- Neutralizer
- Sponge End Wraps
- Instructions and Plastic Cap

## 2 Pick The Correct Perm Rods For Your Desired Hair Style

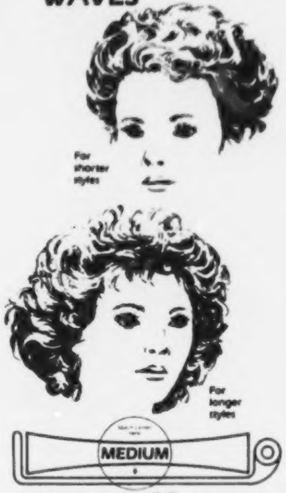
- The smaller the rod, the tighter the curl; the larger the rod the looser the wave.

### BODY



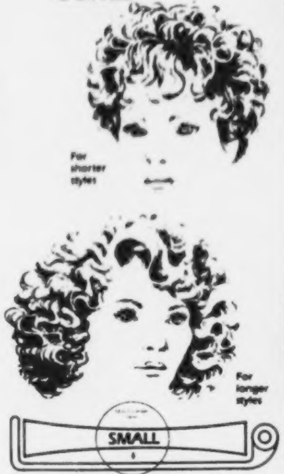
USE AT LEAST 30 RODS

### WAVES



USE AT LEAST 40 RODS

### CURLS



USE AT LEAST 50 RODS

## 3 Read This Important Advice About Perming

For a beautiful perm, FOLLOW ALL INSTRUCTIONS CAREFULLY. Since perming is a chemical process that alters the hair, you must follow instructions to perm successfully and avoid problems.

**BE SURE YOUR HAIR AND SCALP ARE IN GOOD CONDITION**

- Do not perm if your scalp is sore or scratched. Perming may irritate tender scalp.
- Do not perm if your hair has been permed, straightened, bleached or highly lightened or frosted in the last 3 months. Perming can result in temporary hair damage or loss.
- Do not perm if your hair has been treated with henna or color restorers (metallic dyes) in the past 3 months. Perming may give spotty results or discolored hair.
- Always check your hair condition with the Pre-Perm Hair Condition Test, after you prepare your hair.
- If your hair is color-treated, your hair may not be in good condition. Be sure to do the Pre-Perm Hair Condition Test.
- If you have well water containing iron, perming may cause temporary discoloration to light colored hair. Be sure to do the Pre-Perm Hair Condition Test.

**CAUTIONS**

- Waving lotion is harmful if swallowed. Keep away from children.
- Avoid getting waving lotion in eyes. If this happens, immediately rinse eyes thoroughly with water to avoid possible irritation.
- Keep waving lotion away from sensitive face, ear and neck areas by careful application and blocking drips with towel. Immediately rinse off any drips thoroughly with water to avoid possible irritation.
- If you need to stop the perm immediately for any reason, thoroughly rinse the waving lotion, apply neutralizer as shown in the instructions, rinse and then shampoo.
- If hands are sensitive or if you perm frequently, wear rubber or plastic gloves. Wash hands after perming. Discard leftovers.
- Remove jewelry before perming; metal objects can become discolored or can discolor lotion or hair.
- Warning: Keep plastic cap out of reach of babies and children. May cause suffocation.

## 4 Prepare and Test the Condition of Your Hair

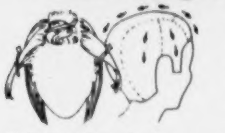
### PREPARE YOUR HAIR

- Trim split ends.
- Shampoo and rinse your hair. DO NOT USE A CONDITIONER BEFORE PERMING.
- Towel dry hair, but leave damp.
- Cover neck and shoulders with a dry towel.
- Don't perm in cool or drafty area, since perm may not take as well.

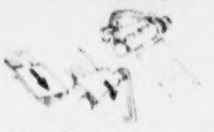
### PRE-PERM HAIR CONDITION TEST

- Roll two curls at crown or where hair is in poorest condition.
- Apply waving lotion to the curls.
- Unroll a curl after 10 minutes. If it feels gummy or sticky, immediately follow the RINSE & NEUTRALIZE STEPS in STEP 7 on back of page. DO NOT PERM UNTIL YOUR HAIR IS IN BETTER CONDITION.
- If your curls do not feel gummy or sticky, follow TIMING/CHECK CURL in STEP 6, then RINSE & NEUTRALIZE in STEP 7 on back of page. If your test curls, when dry, are not frizzy, discolored or easily broken, you're ready to perm. Just cut the two curls out of the way so you won't perm them again.

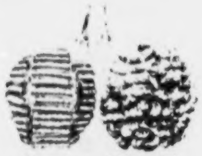
## 5 Sectioning and Roll-Up Tips



- Part clean, damp hair into sections.
- Each section should be NO WIDER than length of the rod you choose.
- Pin up sections you're not rolling, to keep out of the way.
- For each curl, part off a thin hair strand, ¼-½" thick, and no wider than length of rod.
- Hold strand straight out from head and comb smooth. Roll hair in direction of arrows.

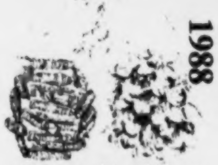


- Fold sponge end wrap around strand. Slide down over ends covering tips completely.
- Place perm rod under end wrap and wind under, firmly and evenly toward scalp. Fasten clasp across top.
- Spread hair evenly across rod and don't bunch ends. SMOOTHNESS PREVENTS FRIZZ.
- Don't put too much hair on rod or roll too tightly, to avoid hair breakage.



**Good Roll-Up = Beautiful Perm**

- Use 30-40 rods for body, 40-50 for waves, 50-60 for curls.
- ¼" to ½" parting (amount of hair matches length and thickness of rod)
- Enclose all hair ends in end wraps (no loose ends)
- Spread hair evenly across rod
- Wind hair snuggly to scalp



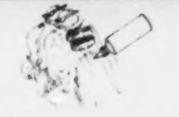
**Poor Roll-Up = Frizzy Uneven Perm**

- Too few rods
- Greater than ½" parting (too much hair on rod)
- Hair ends not enclosed in end wraps (ends sticking out)
- Hair bunched on rod
- Hair wound too loosely

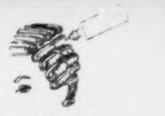
## 6 Choose Method A or B and Begin Perming

### A Lotion Roll-Up Method

- For any style: body, waves or curls on all hair except color treated
- [illegible]



- Hair should be wet before rolling.
- Shake waving bottle well and snip tip off.
- Part hair section the width and thickness of rod. Hold hair out from head.
- Apply waving lotion thoroughly to each tress of hair and comb through before rolling. Use ½ of waving lotion by the end of the roll-up process.
- Begin rolling hair by starting at the crown of the head working down to the neckline, then sides, and front.



- For sensitive skin, after hair is rolled apply petroleum jelly to skin at hair line. Thoroughly wash off after perm.
- After roll-up is complete, saturate the curls using ALL REMAINING WAVING LOTION.
- Blot up drips on skin with towel.
- Begin timing.
- **DO NOT USE PLASTIC CAP NOW** (see Step 7 - **LOCK IN PERM**)

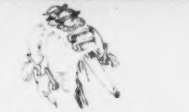
#### Timing

| | |
|---|---|
| **First Curl Check** | **15 MINUTES** |
| **Additional Curl Check Every** | **5 MINUTES** |
| **Maximum Time** | **25 MINUTES** |

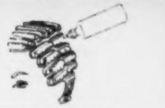
***DO NOT EXCEED MAXIMUM TIME or temporary hair damage or loss may result**

### B Water Roll-Up Method

- Suggested for inexperienced permers, for any type of hair
- For all permed or color treated hair
- Protects the more porous ends even when wrapping



- Keep hair wet while rolling for easier wrap. Re-wet each section if needed. DO NOT USE WAVING LOTION.
- Part hair section the width and thickness of rod. Hold hair out from head and comb smooth.
- Begin rolling hair, starting with any section.
- After roll-up is complete, shake waving lotion well and snip tip off.



- For sensitive skin, after hair is rolled apply petroleum jelly to skin at hair line. Thoroughly wash off after perm.
- Apply waving lotion to every curl. USE ALL THE LOTION.
- Blot up drips on skin with towel.
- Begin timing.
- **DO NOT USE PLASTIC CAP NOW** (see Step 7 - **LOCK IN PERM**)

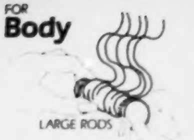
#### Timing

| | |
|---|---|
| **First Curl Check** | **15 MINUTES**<br>**10 MINUTES** for color treated hair |
| **Additional Curl Check Every** | **10 MINUTES**<br>**5 MINUTES** for color treated hair |
| **Maximum Time** | **35 MINUTES**<br>**30 MINUTES** for color treated hair |

***DO NOT EXCEED MAXIMUM TIME or temporary hair damage or loss may result**

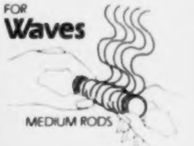
### Curl Check

FOR **Body**



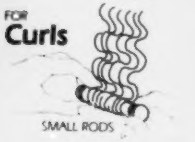
LARGE RODS

FOR **Waves**



MEDIUM RODS

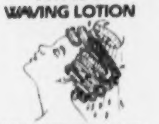
FOR **Curls**



SMALL RODS

- Partially unroll one curl in the crown. Hold it and push up toward scalp until S-shape is formed.
- Compare with pictures above.
- If S-shape indicates wave is not ready, reroll and continue timing. Check different curl each time until curl is ready OR until maximum time is reached.*
- Continue with **RINSE WAVING LOTION** in Step 7.

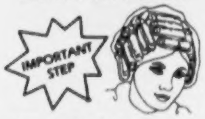
## 7 Rinse WAVING LOTION



- Rinse hair on perm rods with warm water for **3 MINUTES**.
- Gently but thoroughly blot excess water with towel.

(Failure to rinse can result in temporary hair damage or loss.)

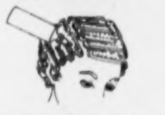
### Lock In Perm



- After waving lotion is rinsed put the plastic cap over rods and secure!
- **WAIT 15 MINUTES,** then remove plastic cap.

(Unlike other methods, this step gives a stronger perm with no risk of damage since waving lotion has been rinsed off.)

### Neutralize

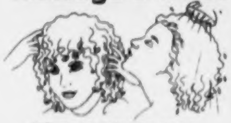


- SHAKE NEUTRALIZER BOTTLE WELL and snip tip.
- Apply neutralizer to every curl using all the neutralizer.

(Failure to neutralize can result in temporary hair damage or loss.)

- **WAIT 5 MINUTES.**

### Massage & Rinse



- Gently remove the rollers without pulling or tugging.
- With fingers, gently work neutralizer through to the ends of hair.
- Rinse thoroughly with lots of warm water.
- Blot dry with towel.

## 8 Style

Your new perm is now ready for your favorite style. You can set it with rollers and dry [illegible] completely [illegible] curling wand. DO NOT pull or stretch hair. Wait at least a day before shampooing [illegible] Wait [illegible] before coloring your hair. Check hair condition before [illegible]. Wait 3 months before perming again.

**QUESTIONS OR COMMENTS?** **If you have any questions or coments about Lilt, please call us toll-free at 1-800-262-1637.**

1958

**MIRACLE MIST**

# New Lilt

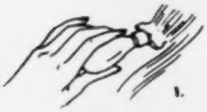
with neat, easy *Speed Bath Set*

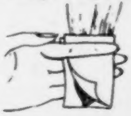
*in addition . . . you will need:*

- Shampoo
- Comb
- Scissors
- Any home permanent curlers
- Bath towel
- Large pitcher
- Clock

## HOW TO WIND CURLS

- The method of winding each curl is the same. After using the Squeeze Bottle to comb lotion through the hairstrand as shown in Picture 1, fold an end paper around it. Be sure the end paper covers all the hair ends. See Picture 2.
- Place the curler under the end paper and wind under smoothly and evenly. See Picture 3.


1.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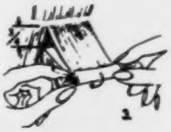
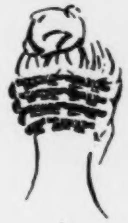

3.

- Avoid "bunching" the hair in the center of the curler. Use your finger tips to spread hair along the curler as you wind. The waving lotion does its best job when the hair is firmly and evenly wound.
- The curler should be securely fastened making especially sure that it cannot slip.
- In resaturating the wound curl it is very important to soak the curl all the way through. Hold the lotion bottle with Saturator Tray under the wound curl. Place the squeeze-comb tip against the curl and gently squeeze lotion into every curl.

## WHERE TO WIND CURLS

### *neckline section*

Wind this section first. Tie front and crown hair out of the way, then start with the upper row, apply lotion and wind curlers close to scalp. See Picture 1.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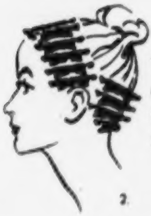
### *front section*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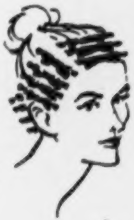
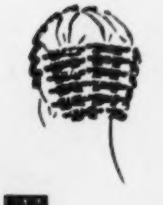
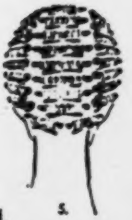
Wind this section next. For a center or side part, wind as shown in Picture 2. If you wear bangs, place curlers as shown in Picture 3.


3.

### *crown section*



Wind this section last. For end curls in a smooth-crown style, wind hair to an inch above the point where you want curl. See Picture 4. For curly-top style, wind curlers all the way to scalp (but not uncomfortably close), using additional curlers as shown in Picture 5.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## IMPORTANT

### *advice before waving*

- *If your scalp is tender, sore or scratched,* postpone permanent until condition clears up.
- *If your hands are sensitive or irritated, or if you give home permanents frequently,* wear rubber gloves.
- *If your hair is bleached, color treated, or in delicate condition* (dry, brittle, breaking off, etc.) make test curls to determine whether your hair can take a wave. (Split ends should be trimmed.)
  Go through the entire waving procedure on two strands which show the maximum effect of bleach or color treatment, or which are in a delicate condition. If *at any time* these strands feel sticky or gummy, use Miracle Mist at once and do not wave any more of your hair. If your test curls, when dry, are frizzy, discolored, break easily or show any other signs of hair damage, return the unused portion of this kit to me, in exchange for another LILT to use when your hair is in better condition for waving.
- *Keep waving lotion and Miracle Mist* out of eyes, ears, nose, and mouth. If any lotion or Miracle Mist reaches these or any other sensitive area, rinse immediately with clear water. (A water rinse will also help to avoid stains from spills on clothing or furniture.)
- *Remove rings and other jewelry before giving the permanent.*
- *Use only home permanent curlers.*
- *Be sure to write to me for advice on any hair care questions.*

**Katherine Potter**
**c/o LILT Home Permanent**
**Procter & Gamble**
**Cincinnati 1, Ohio**

# NEW EASY DIRECTIONS

*FIRST trim, shampoo. Leave hair slightly damp. Fill plastic Squeeze Bottle with LILT Waving Lotion. Read "How to Wind Curls" and "Where to Wind Curls" on other side.*

## WINDING

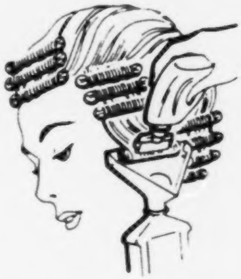
1

. . . start at neckline section; then front; then top. Take hairstrand wide as a curler and about ¾" deep.

*saturate* hair with comb-tip applicator, gently squeezing bottle and combing lotion through to very end of hairstrand.

*fold end-paper* over hairstrand; wind under smoothly on curler.

*resaturate* after winding curls: Refill Squeeze Bottle, then screw Saturator Tray tightly onto neck of glass lotion bottle. Hold bottle so that Saturator Tray is under wound curl as you squeeze lotion through curl. Any lotion which runs back into the lotion bottle should be used to refill Squeeze Bottle until all curls are resaturated.



## TIMING

2

. . . leave hair on curlers and wait 10 minutes (or for a loose casual wave wait 5 minutes, for a very curly wave wait 20 minutes.) Then . . .

*rinse* wound curls with comfortably hot water. (Use spray or several pitcherfuls of water.)

*blot* very thoroughly, still leaving curlers in place.

*cover* head with towel for 30 minutes. While timing your wave, empty both sides of the Miracle Mist packet into a large clean pitcher. Then pour in just 2 cups of comfortably hot water. Stir gently. Rinse Squeeze Bottle, then fill with Miracle Mist. Empty and rinse lotion bottle, and replace Saturator Tray on neck of lotion bottle as before.

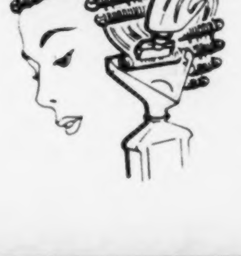
## USING MIRACLE MIST

3

**IMPORTANT**. . . using Saturator Set, squeeze Miracle Mist into curl, holding Saturator Tray underneath. Soak each curl. Refill Squeeze Bottle with fresh Miracle Mist; *soak each curl again.*

*remove curlers* and pour rest of Miracle Mist through loosened hair, spreading curly ends to make sure every hair is well soaked.

*rinse hair* thoroughly with lukewarm water. Your LILT Wave is finished, ready to set in your favorite hairstyle.



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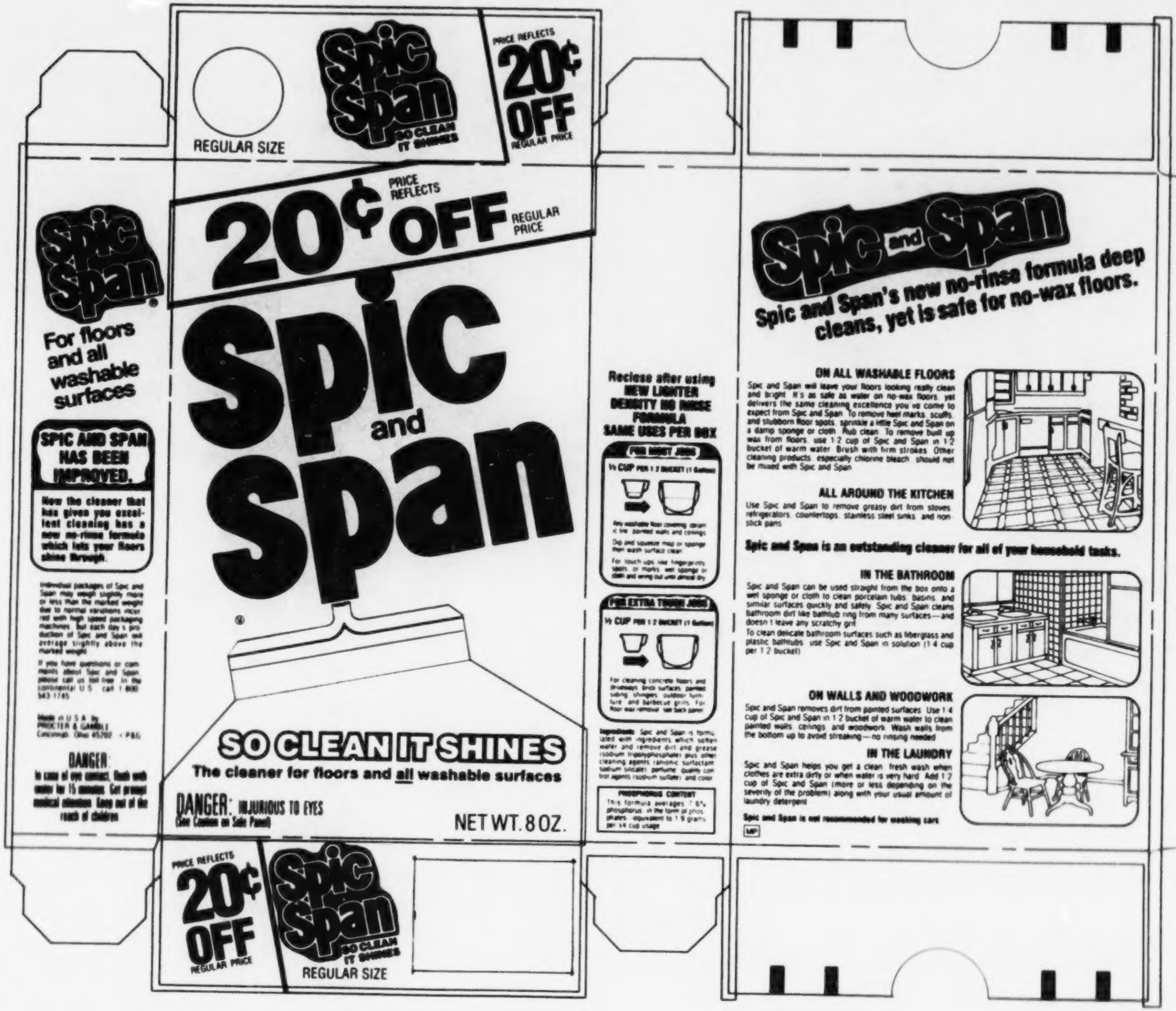
1986



REGULAR SIZE

Spic and Span SO CLEAN IT SHINES

PRICE REFLECTS 20¢ OFF REGULAR PRICE

## 20¢ OFF

PRICE REFLECTS REGULAR PRICE

# Spic and Span®

## SO CLEAN IT SHINES

The cleaner for floors and all washable surfaces

**DANGER:** INJURIOUS TO EYES
(See Caution on Side Panel)

NET WT. 8 OZ.

Spic and Span®

For floors and all washable surfaces

**SPIC AND SPAN HAS BEEN IMPROVED.**

**Now the cleaner that has given you excellent cleaning has a new no-rinse formula which lets your floors shine through.**

Individual packages of Spic and Span may weigh slightly more or less than the marked weight due to normal variations incurred with high speed packaging machines. But each day's production of Spic and Span will average slightly above the marked weight.

If you have questions or comments about Spic and Span, please call us toll-free. In the continental U.S., call 1-800-543-1745.

Made in U.S.A. by
PROCTER & GAMBLE
Cincinnati, Ohio 45202 · P&G

**DANGER:**

**In case of eye contact, flush with water for 15 minutes. Get prompt medical attention. Keep out of the reach of children.**

**Reclose after using**
**NEW LIGHTER DENSITY NO RINSE FORMULA**
**SAME USES PER BOX**

**FOR MOST JOBS**

¼ CUP PER 1/2 BUCKET (1 Gallon)

Any washable floor covering, ceramic tile, painted walls and ceilings.

Dip and squeeze mop or sponge, then wash surface clean.

For touch-ups like fingerprints, spots, or marks, wet sponge or cloth and wring out until almost dry.

**FOR EXTRA TOUGH JOBS**

½ CUP PER 1/2 BUCKET (1 Gallon)

For cleaning concrete floors and driveways, brick surfaces, painted siding, shingles, outdoor furniture, and barbecue grills. For floor wax removal, see back panel.

**Ingredients:** Spic and Span is formulated with ingredients which soften water and remove dirt and grease (sodium tripolyphosphate) plus other cleaning agents (anionic surfactant, sodium silicate), perfume, quality control agents (sodium sulfate) and color.

**PHOSPHORUS CONTENT**
This formula averages 7.6% phosphorus, in the form of phosphates, equivalent to 1.9 grams per 1/4 cup usage.

## Spic and Span

**Spic and Span's new no-rinse formula deep cleans, yet is safe for no-wax floors.**

### ON ALL WASHABLE FLOORS

Spic and Span will leave your floors looking really clean and bright. It's as safe as water on no-wax floors, yet delivers the same cleaning excellence you've come to expect from Spic and Span. To remove heel marks, scuffs, and stubborn floor spots, sprinkle a little Spic and Span on a damp sponge or cloth. Rub clean. To remove built up wax from floors, use 1/2 cup of Spic and Span in 1/2 bucket of warm water. Brush with firm strokes. Other cleaning products, especially chlorine bleach, should not be mixed with Spic and Span.

### ALL AROUND THE KITCHEN

Use Spic and Span to remove greasy dirt from stoves, refrigerators, countertops, stainless steel sinks, and non-stick pans.

**Spic and Span is an outstanding cleaner for all of your household tasks.**

### IN THE BATHROOM

Spic and Span can be used straight from the box onto a wet sponge or cloth to clean porcelain tubs, basins, and similar surfaces quickly and safely. Spic and Span cleans bathroom dirt like bathtub ring from many surfaces—and doesn't leave any scratchy grit.

To clean delicate bathroom surfaces such as fiberglass and plastic bathtubs, use Spic and Span in solution (1/4 cup per 1/2 bucket).

### ON WALLS AND WOODWORK

Spic and Span removes dirt from painted surfaces. Use 1/4 cup of Spic and Span in 1/2 bucket of warm water to clean painted walls, ceilings, and woodwork. Wash walls from the bottom up to avoid streaking—no rinsing needed.

### IN THE LAUNDRY

Spic and Span helps you get a clean, fresh wash when clothes are extra dirty or when water is very hard. Add 1/2 cup of Spic and Span (more or less depending on the severity of the problem) along with your usual amount of laundry detergent.

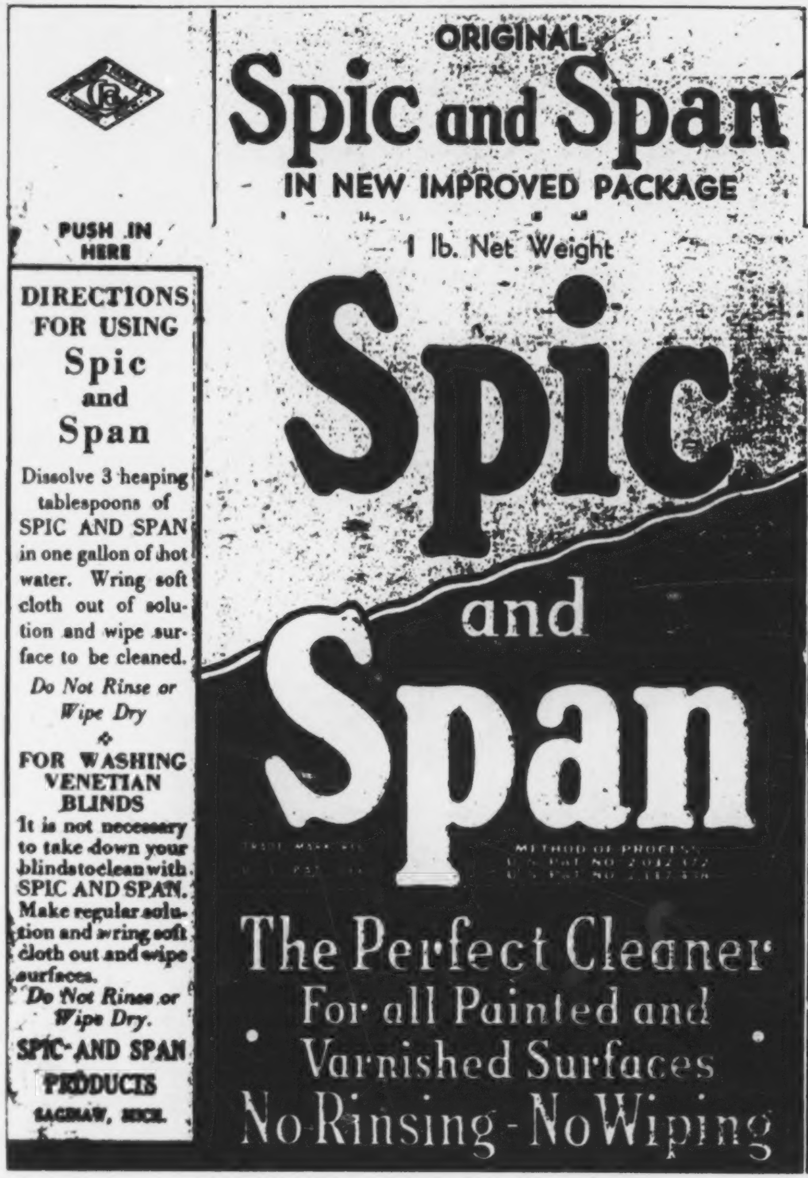
**Spic and Span is not recommended for washing cars.**

MP

PRICE REFLECTS 20¢ OFF REGULAR PRICE

Spic and Span SO CLEAN IT SHINES

REGULAR SIZE



PUSH IN HERE

**DIRECTIONS FOR USING**
**Spic and Span**

Dissolve 3 heaping tablespoons of SPIC AND SPAN in one gallon of hot water. Wring soft cloth out of solution and wipe surface to be cleaned.

*Do Not Rinse or Wipe Dry*

◆

**FOR WASHING VENETIAN BLINDS**

It is not necessary to take down your blinds to clean with SPIC AND SPAN. Make regular solution and wring soft cloth out and wipe surfaces.

*Do Not Rinse or Wipe Dry.*

**SPIC AND SPAN PRODUCTS**
SAGINAW, MICH.

ORIGINAL
**Spic and Span**
IN NEW IMPROVED PACKAGE

1 lb. Net Weight

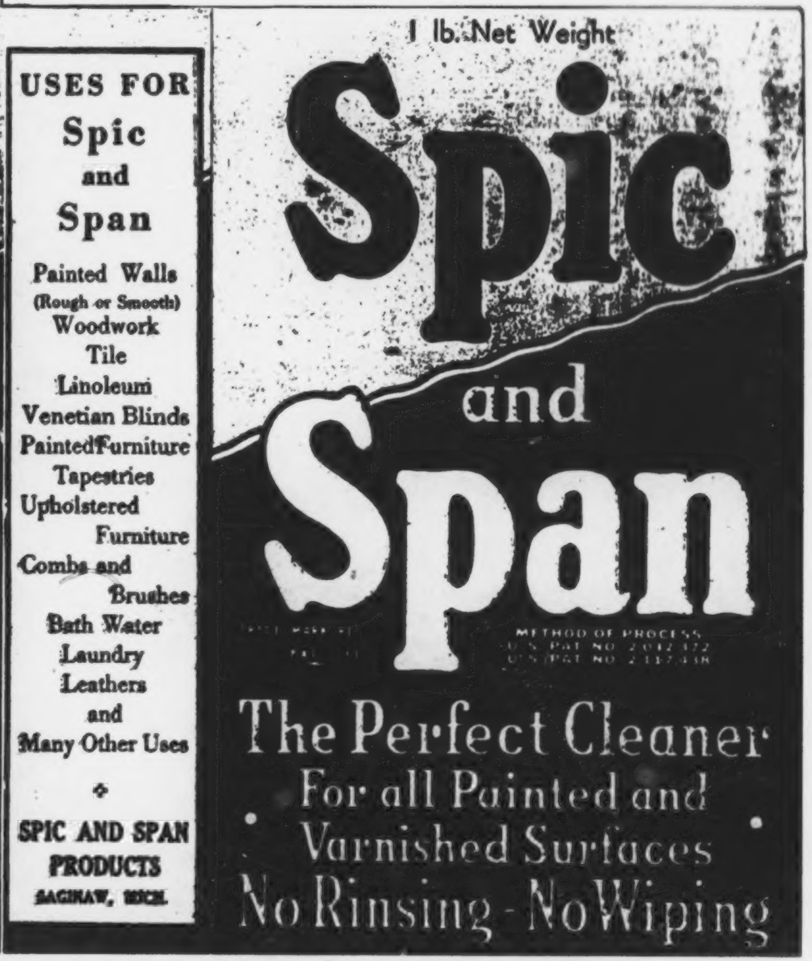
**Spic and Span**

TRADE MARK REG. U. S. PAT. OFF.

METHOD OF PROCESS
U. S. PAT. NO. 2,012,172
U. S. PAT. NO. 2,117,438

The Perfect Cleaner
For all Painted and Varnished Surfaces
No Rinsing - No Wiping

245



**USES FOR**
**Spic and Span**

Painted Walls
(Rough or Smooth)
Woodwork
Tile
Linoleum
Venetian Blinds
Painted Furniture
Tapestries
Upholstered Furniture
Combs and Brushes
Bath Water
Laundry
Leathers
and
Many Other Uses

◆

**SPIC AND SPAN PRODUCTS**
SAGINAW, MICH.

1 lb. Net Weight

**Spic and Span**

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246

1963

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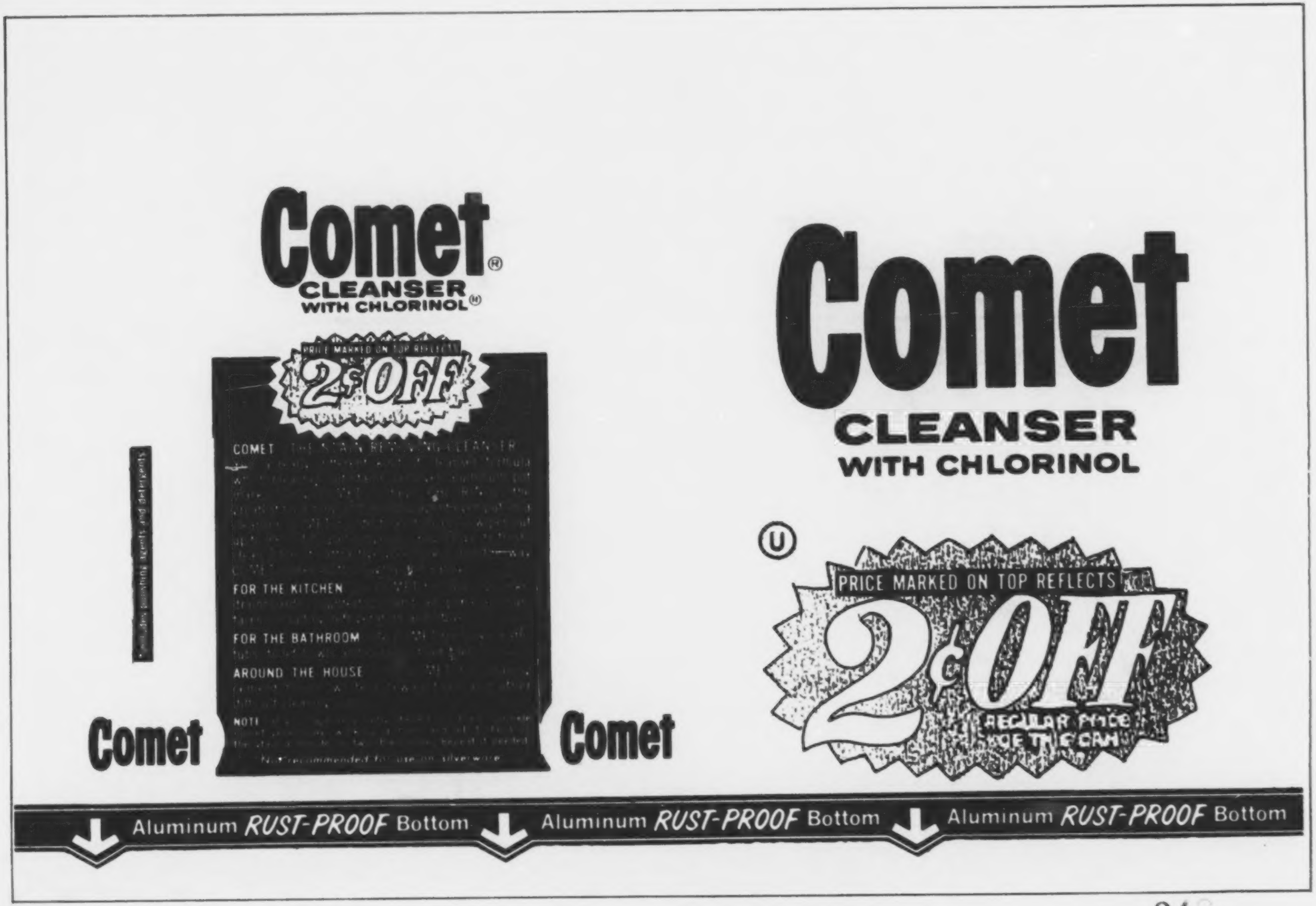
Comet®
CLEANSER
WITH CHLORINOL®
PRICE MARKED ON TOP REFLECTS
2¢ OFF
COMET
FOR THE KITCHEN
FOR THE BATHROOM
AROUND THE HOUSE
NOTE
Not recommended for use on silverware
Comet
Comet
Comet
CLEANSER
WITH CHLORINOL
Ⓤ
PRICE MARKED ON TOP REFLECTS
2¢ OFF
REGULAR PRICE OF THE CAN
Aluminum RUST-PROOF Bottom
Aluminum RUST-PROOF Bottom
Aluminum RUST-PROOF Bottom

248

247

1986

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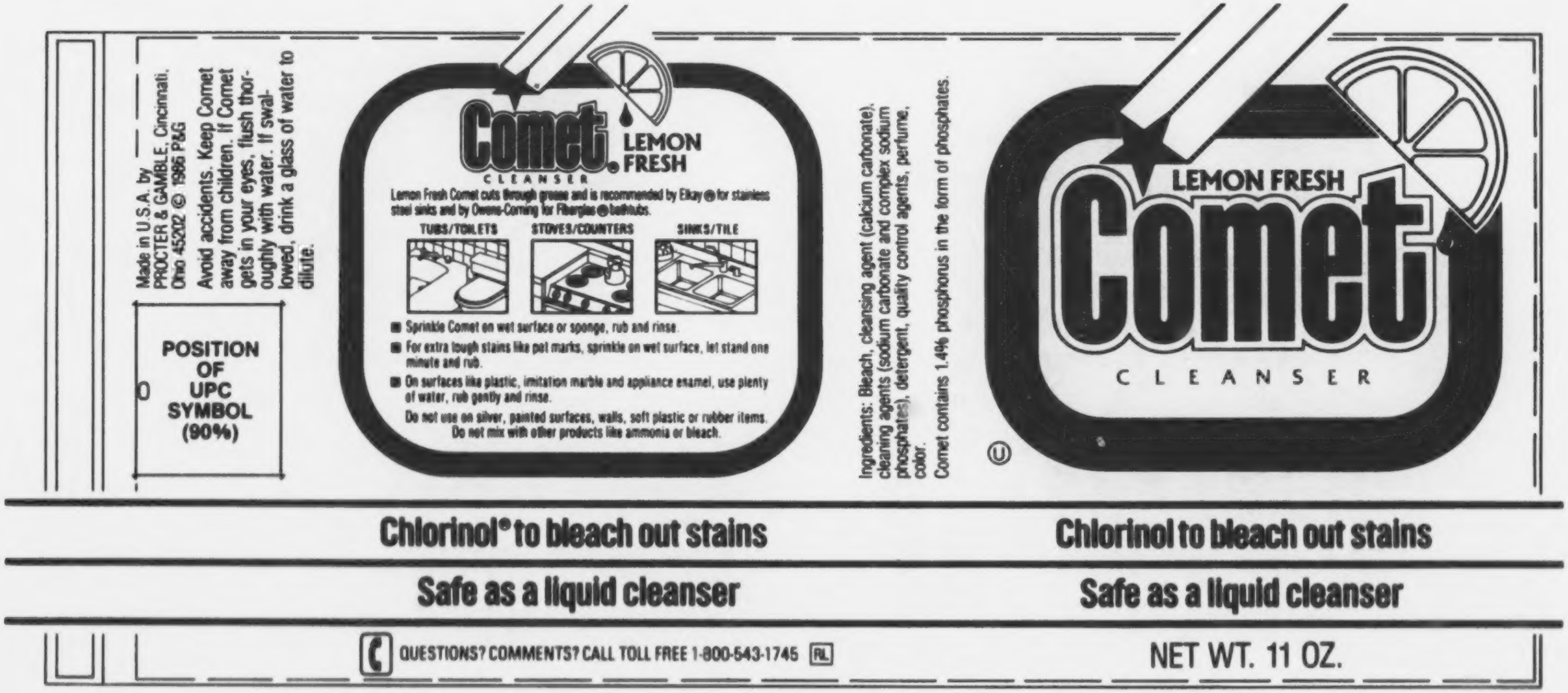

Made in U.S.A. by
PROCTER & GAMBLE, Cincinnati,
Ohio 45202 © 1985 P&G

Avoid accidents. Keep Comet away from children. If Comet gets in your eyes, flush thoroughly with water. If swallowed, drink a glass of water to dilute.

POSITION
OF
UPC
SYMBOL
(90%)

**Comet®** LEMON FRESH
CLEANSER

Lemon Fresh Comet cuts through grease and is recommended by Elkay® for stainless steel sinks and by Owens-Corning for Fiberglas® bathtubs.

- Sprinkle Comet on wet surface or sponge, rub and rinse.
- For extra tough stains like pot marks, sprinkle on wet surface, let stand one minute and rub.
- On surfaces like plastic, imitation marble and appliance enamel, use plenty of water, rub gently and rinse.

Do not use on silver, painted surfaces, walls, soft plastic or rubber items.
Do not mix with other products like ammonia or bleach.

Ingredients: Bleach, cleansing agent (calcium carbonate), cleaning agents (sodium carbonate and complex sodium phosphates), detergent, quality control agents, perfume, color.

Comet contains 1.4% phosphorus in the form of phosphates.

LEMON FRESH
**Comet**
CLEANSER

Chlorinol® to bleach out stains

Safe as a liquid cleanser

QUESTIONS? COMMENTS? CALL TOLL FREE 1-800-543-1745

Chlorinol to bleach out stains

Safe as a liquid cleanser

NET WT. 11 OZ.

STUDENT ACTIVITY

# Super Sleuth

**Locate all of the household chemicals you can find in your home. List according to the room or storage area. Beside the product, label as follows:**

- **P (poison)** if the word "poison" and/or a skull and crossbones appears on the label
- **D (danger)** if the word "danger" appears on the label or it indicates it is extremely flammable, toxic or corrosive
- **C (caution)** if the word "caution" or "warning" appears
- **Leave blank** if none of these statements are on the label

| **KITCHEN (excluding food)** | | **BATHROOM/BEDROOM** | |
|---|---|---|---|
| **Product** | **Label** | **Product** | **Label** |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| **CLEANING CLOSET/SHELF** | | **LAUNDRY/STORAGE AREA** | |
|---|---|---|---|
| **Product** | **Label** | **Product** | **Label** |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**GARAGE, BASEMENT OR AREA WHERE PAINT PRODUCTS AND PRODUCTS USED OUTSIDE ARE STORED**

| **Product** | **Label** | **Product** | **Label** |
|---|---|---|---|
| | | | |
| | | | |

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# Super Sleuth Summary Sheet

___Total number of household chemical products (excluding food)

___ Number labeled "caution" or "warning"

___ Number labeled "danger"

___ Number labeled "poison"

___ Number not labeled "caution," "warning," "danger" or "poison."

**What types of products (such as medicines, personal care products, detergents, household cleansers, paint products and pesticides) contain:**

1. None of these labels?

2. A "caution" or "warning" label?

3. A "danger" label?

4. A "poison" label?

STUDENT
READING

# A Guide to Safe Disposal of Household Chemicals

Just as household chemical products must be used according to directions, they must also be disposed of safely. The safe disposal of household chemicals requires two tests:

1. Will it harm people?
2. Will it harm the environment?

Most household wastes can be disposed of safely. Laundry detergents, soaps and most household cleansers are intended to go down the drain in normal use. The best disposal method is to use as much of the product as possible. If some of the product remains, dilute with water and flush down the drain. Do not put more than one product down the drain at a time. Household chemical products should NOT be mixed.

Hazardous waste materials include poisons, acids, paints and solvents. Use and reuse as much as possible. Solidify liquid wastes — for example, leave paint can lids open to dry leftover paint. Then put the cans in the trash. NEVER dispose of hazardous wastes down the sink drain or into the sewer system. Do not burn or dump any hazardous wastes on the ground.

The Environmental Protection Agency (EPA) suggests the following guidelines for safe product disposal:

1. **Acids and alkalines.** Acids and alkalines are the main ingredients in some cleaning compounds and in drain openers. Use these materials completely according to label directions whenever possible. These products are highly usable even when a few years old.

2. **Aerosols.** Be sure to empty aerosol containers completely before disposing with other trash to prevent an explosion hazard. Purchase pump sprays instead of aerosols when available.

3. **Antifreeze.** Animals and children are attracted to the sweet taste of antifreeze. Don't pour it on the ground. Used antifreeze can be diluted thoroughly with water and poured down the drain.

4. **Bleach.** NEVER mix chlorine bleach with ammonia or acidic products such as drain, toilet bowl and metal cleaners. Toxic fumes (strong enough to be fatal) will result. Even old chlorine bleach can still be used and is harmful when mixed with such products.

5. **Cleaners and polishes.** Cleaners and polishes (furniture polish and rug, floor and oven cleaners) should be used completely whenever possible. Seal empty containers and dispose of them with the rest of your garbage.

6. **Disinfectants.** Disinfectants contain strong chemicals so use them completely according to label instructions and with caution.

7. **Gasoline.** Avoid buying more than you can use in six months. Store in a cool dry place. Use completely by mixing old gasoline with fresh gasoline. Store in an approved container.

8. **Insecticides.** Use insecticides according to label directions. Avoid disposal whenever possible. If you can't use the material, see if a neighbor or garden club can. Never reuse the containers.

9. **Paint.** Small amounts of paint can be hardened by taking the lid off the can. Once the paint is solid, you can put it in the trash.

10. **Solvents.** You can clean used solvents (paint thinner, turpentine, varnish) by allowing the paint or dirt particles to settle out in a container. Do not dump onto soil or down sewers, drains or the toilet.

Wastes which are dumped on the ground or in a street drain will eventually flow to surface and groundwater where they may pollute drinking water. Burning some waste products may release toxic fumes or gases into the air.

Adopt the slogan: **THINK BEFORE YOU THROW IT OUT.**

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STUDENT
READING

# Accidental Poisonings:

## Symptoms and Treatments

Most accidental poisonings take place in the home. Two-year-olds are at the greatest risk of accidental poisoning? Why? Picture the average two-year-old — curious, fearless, climbing, exploring and unable to read. Then think about a bottle of aspirin left on the table, a safety cap not secured on a can of drain cleaner, a toxic houseplant within reach.

Children under the age of five are the most frequent victims of accidental poisonings. Unintentional poisonings by solids and liquids is the fifth leading cause of accidental death for children 1-15 years old and the sixth leading cause of accidental deaths for all age groups in the United States.

Deaths of elderly adults from accidental poisonings have doubled over the last 30 years. Adult poisonings most frequently occur because a toxic substance has been poured into another container such as a milk carton or soda can. Overdose of medicines or drugs is another frequent cause of accidental poisoning.

| TYPE OF POISONING | SYMPTOMS | SUGGESTED TREATMENTS |
|---|---|---|
| 1. Swallowed | Breathing difficulty vomiting, burns in mouth, unconscious | Remove anything remaining in the mouth. Call the poison control center. If advised, administer syrup of ipecac to induce vomiting. |
| 2. Poison on the skin | Burns, rash, allergic reactions | Remove wet clothing. Rinse the skin with warm water. Then wash gently with soap and water and rinse off the skin. Call the poison control center if the person is in distress. |
| 3. Poison in the eye | Burning, irritation, loss of vision | Gently hold the eyelids open. Flood the eye with lukewarm water for 10-15 minutes. Do not let the person rub his or her eyes. |
| 4. Inhaled poison | Suffocation, breathing difficulty | Immediately move the person to fresh air. Avoid breathing fumes yourself. Check pulse and breathing. Start CPR if necessary. |

Every home medicine cabinet should stock syrup of ipecac, available from a drug store.

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STUDENT
READING

# General Emergency Procedures

Post the number of your poison control center, hospital emergency line, emergency squad or 911 number.

Remember to check the product label to see if there are any special instructions. If there is an 800 number listed on the label, call for information.

Be prepared to give:

1. Age and weight of the victim
2. Identity of product and ingredients
3. Estimate of amount consumed
4. Symptoms
5. Time when the ingestion or exposure occurred

If you are instructed to go to the emergency room, take the poisonous substance and container with you.

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STUDENT
ACTIVITY

# Consumer Bloopers

The safety policy of the Procter & Gamble Company states that "... consumer products will be safe for intended use... and foreseeable misuse."

Brainstorm and list possible ways consumers might misuse the following products:

**TEAM**________________________________

A. **Laundry detergents**

B. **Solid shortening or cooking oil**

C. **Dishwashing detergent**

D. **Fabric softener**

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STUDENT
ACTIVITY

# Solid Waste Disposal

Garbage disposal isn't a very exciting topic to the average American teen. However, it may significantly affect the quality of life for your generation. Disposing of the volume of solid waste we produce is a problem and the problem is likely to get worse in your lifetime. Remember the barge loaded with tons of garbage with no place to go?

Every man, woman and child in American creates about 3.5 pounds of solid waste per day. How much solid waste does your family generate? Solid waste is everything we use and discard — paper, food, plastics, cans, glass, clothing, metal, old appliances, furniture, cars.

Solid waste creates many problems. For example, litter along the highway is ugly. Unfortunately, much of our trash stays with us for centuries. It is possible that an aluminum can may last a billion years and glass containers even longer.

Try this quiz on solid waste. Circle the correct answers.

1. The amount of solid waste per person the United States generates increases each year. a. true b. false
2. Most solid waste gets buried in landfills. a. true b. false
3. In the United States, many landfills for solid waste are a. being opened b. being closed.
4. The United States recycles what percent of its solid waste? a. 10% b. 35% c. 50%
5. Japan recycles what percent of its solid waste? a. less than 10% b. 35% c. 50%
6. The United States burns what percent of its solid waste? a. less than 10% b. 35% c. 50%
7. Sweden burns what percent of its solid waste? a. less than 10% b. 35% c. 50%
8. How much of America's solid, non-recyclable waste could be burned to generate energy? a. up to 50% b. up to 80% c. up to 98%
9. Plastic packaging accounts for what percent of United States solid waste? a. 4% b. 12% c. 19%
10. Most of our solid waste is composed of? a. food b. paper c. glass d. plastic

Manufacturers are concerned about the solid waste issue and are proactively seeking solutions. For example, Procter & Gamble is testing a new container for Spic and Span made from recycled soft drink bottles which, in turn, can be recycled into insulation, carpet backing and other goods. Products are being combined (detergent with bleach, shampoo with conditioner) to help reduce the source of solid waste. Procter & Gamble also developed new super-absorbent gel cores to make Pampers and Luvs diapers thinner. The diapers now contribute half the volume to landfills as before. Procter & Gamble recently introduced a concentrated refill for its Downy fabric softener that uses 75 percent less packaging material. The new package is aimed at reducing solid waste.

**WHAT IS OUR RESPONSIBILITY AS CONSUMERS TO HELP SOLVE THE SOLID WASTE PROBLEM IN AMERICA?**

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STUDENT
ACTIVITY

# Packaging Decisions

A manufacturer must decide how to package baby lotion. The product developers meet to discuss this problem. What decisions might be made if the product developer was primarily concerned with each of these values?

Write the correct number in the blank.

**PACKAGING DECISION**

___a. Use a flip top lid for easy access

___b. Make the package from recycled materials

___c. Make the package colorful

___d. Use a child-resistant cap

___e. Use a lighter weight material to save costs

___f. Make package refillable

___g. Design the package to maximize shipping and shelf space

**VALUES**

1. Aesthetics
2. Environmental protection
3. Safety
4. Convenience
5. Economics

If you were the manufacturer, how would you rank these alternatives? Justify your packaging decision.

Procter & Gamble faced such a packaging decision with the dishwasher detergent, Liquid Cascade. Their decision involved choosing between packaging options offering more safety and less convenience and options that offered convenience, but were potentially not quite as safe. Their packaging team developed three options. Which option would you choose? Justify your response.

> **Option 1** - Rely on the fact that although there is an ingredient in Liquid Cascade that could potentially cause harm if swallowed, the chances are very slim of such harm occurring because the product is emetic — that is, it will cause vomiting before a harmful amount can be swallowed. No other manufacturer of liquid dishwashing detergents offer this additional protection.
>
> **Option 2** - Market the product with a child-resistant cap. Consumers find this inconvenient. However, it is worth causing some inconvenience to reduce the risk even further.
>
> **Option 3** - Produce a product which contains no ingredients which would be harmful if ingested. Such a product would not be as effective in cleaning dishes and hence would probably not sell well. However, the product would be both safe and convenient to use.

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# Safe Soap

Americans come in contact with soap and detergent products several hundred million times a day through personal bathing, laundering, dishwashing and any number of other household cleaning chores.

Consumers may think primarily of the safety of products in terms of how those products are used in the home. Manufacturers are concerned about:

**Safety to humans:**

- To the people who make the product
- To consumers who use the product
- To consumers who may accidentally misuse the product

**Safety to the environment as a result of product manufacture and use:**

- To sewage disposal systems
- To bodies of water
- To aquatic life (fish and plants)
- To animals

**Safety to material with which the product will come in contact:**

- Laundry appliances and their component parts
- The vast array of fibers, fabrics, dyes and finishes in the family wash

**Safety testing.** Detergents aren't supposed to be eaten, but children, especially toddlers, are great explorers and tasters and have been known to eat or drink a detergent. What happens to the child who does? Detergents aren't supposed to be rubbed in the eyes, but it can happen. Will the product be mild to the skin if used regularly?

Because consumer use of most detergents involves regular contact with the skin, manufacturers do skin testing with human volunteers. Finally, a new product is used in tests in homes with groups of homemakers. A dermatologist (doctor who specializes in problems of the skin) examines each person's hands before and after use.

**Environmental studies.** Biologists, chemists and sanitary engineers review new materials to be sure they are safe for the environment. Tests determine how the material is biodegraded and removed during wastewater treatment. New chemicals are tested to be sure they will not harm fish or other aquatic life such as insects or plants.

**Safety to materials.** The effects of the product on laundry appliances and on the materials used in their construction (porcelain, aluminum, stainless steel, plastics) are studied. Testing is done to ensure the product will not be damaging to fabrics and its effects of dyes, finishes, metals (such as those used in zippers), buttons and the like are carefully reviewed.

Only after all the tests have provided practical assurance of safety — and after extensive testing in the laboratory and by consumers has shown the product to be effective — is the product ready to be marketed.

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# Partners in Product Safety

**Product: PAPER TOWEL FOR MICROWAVE COOKING**

**Product developer:** The developer would ask whether the product is safe for contact with food. Will the paper towel burn in the microwave? When Procter & Gamble developed Bounty Microwave towels, they first determined that all material requirements prescribed by FDA for products that come in contact with food were met. Then the towels were reviewed by a major university and found successful for use in microwave cooking. Fire safety was tested by outside consultants and inside the company as well. Procter & Gamble performed an extensive battery of tests by microwaving with representative food materials.

**Product: DISPOSABLE DIAPERS**

**Product developer:** The developer needs to determine safety for babies' skin. Procter & Gamble researched information about the safety of the materials used in Ultra Pampers. Scientists then conducted extensive laboratory tests with the material. Following laboratory tests, they conducted actual use tests. Several hundred babies used this product for many weeks. The babies were examined regularly. They included children who were known to have very sensitive skin. Product safety scientists also asked nationally recognized experts in areas such as pediatrics and nursing to review all of their safety data.

**Product: ANTI-DANDRUFF SHAMPOO**

**Product developer:** The developer needs to determine safety for people's scalp and hair. Will the shampoo burn the eyes? When Procter & Gamble developed the Head & Shoulders product, scientists ran more than fifty clinical studies. These tests studied potential effects such as eye irritancy and confirmed the product was safe for the scalp, skin and safe for the hair — also that it did not discolor the hair. The clinical studies involving people were conducted in many cities throughout the United States. Participants in the studies were identified as having dandruff. The clinical tests were performed over a six week period.

**Product: ORANGE JUICE FORTIFIED WITH CALCIUM**

**Product developer:** The developer needs to be sure the new product does not introduce new risks of medical problems to consumers. Although all the ingredients are safe and commonly used in other foods or beverages, calcium is not expected in orange juice, and purchasers and their families may not be aware it is there. To evaluate this, Procter & Gamble assembled two groups of scientists. First, a group of Procter & Gamble experts met and asked as many questions as they could about product safety to make sure all possible issues were covered. Then a group of non-Procter & Gamble medical and nutrition experts from all over the United States were brought together to review the plans, formulas and all the safety data. Only when this second group was satisfied that consumers were safe was the product, Citrus Hill Plus Calcium, marketed. In addition, Procter & Gamble scientists continue to review new information as it is published to ensure continuing safety of the product.

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STUDENT
READING

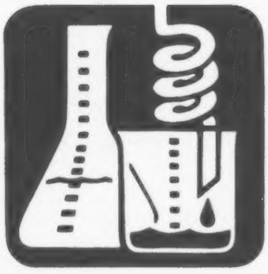
# Tartar Control Crest

## A Case Study in Consumer Product Safety

The oldest recorded belief about toothaches is that they were caused by a "toothworm." Ancient Babylonian texts describe toothaches caused by demons that took the shapes of worms and invaded teeth. In ancient Greece, bleeding gums were cauterized with a red-hot iron. In France during the Middle Ages, open markets served as a dental office for the poor. Teeth were extracted by self-taught gypsies. A red-hot knife was plunged into the gum to stop a toothache. Dentists came to the homes of the wealthy, bringing their instruments with them. Their dental drills were thin metal rods turned by rolling them between the palms. Decayed teeth were sometimes drilled and then filled with soft materials that stopped the pain by keeping air from the open cavity. Usually the offending tooth was simply removed.

Regular dental hygiene is an important part of our daily lives. Americans today enjoy an unprecedented level of dental health in spite of a diet high in sugar and other foods that promote tooth decay. The above descriptions of early dentistry bother most readers. Today's visit to the dentist is very different from visits even our grandparents might have taken. We find it hard to believe that one of the most basic notions of dental science — the role of bacterial infection in tooth decay — was not discovered until the end of the 19th century, more than 4,000 years after the first descriptions of the Babylonian "toothworm."

Most adults brush their teeth at least twice daily. Many young people, especially those who wear braces, brush even more often. Can you think of another consumer product besides toothpaste we put into our mouths more often, and on a regular basis for our entire lives? Probably not. We expect toothpaste to cause problems for cavities, not for us. Few of us realize the extensive behind-the-scenes scientific testing which goes on to make sure our dental care products continue to be effective and safe.



In the late 1930s, Procter & Gamble invested an enormous amount of time, money and other resources to produce a toothpaste that would fight cavities. Many different formulations were tried before a compound called stannous flouride was proven to be effective in preventing tooth decay. Numerous long-term clinical trials with children and adults were then conducted, supervised by doctors and scientists, to ensure the product was safe and effective. At the end of the tests, the number, location and severity of cavities were compared. The results were clear. People who brushed with a toothpaste containing stannous flouride had significantly fewer cavities than people using the same toothpaste without the flouride formula.

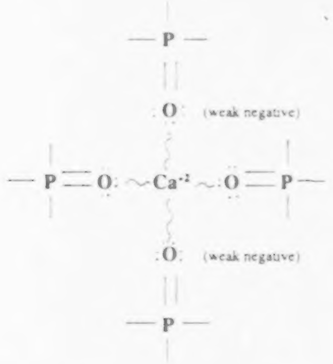
The new formula was given the name "Crest." In 1960, the American Dental Association (ADA) publicly recognized Crest's effectiveness in reducing cavities "...when used in a conscientiously applied program of oral hygiene and regular professional care." This was the first time the ADA had ever endorsed a particular toothpaste to the public.

But how does Crest reduce the chance of tooth decay? The important role of bacteria in tooth decay was mentioned earlier. In fact, just minutes after you brush, a thin coating of bacteria called placque may form on tooth surfaces. These bacteria break down the sugar and similar molecules in foods into acids which then attack tooth enamel. Over time, this erosion can lead to cavities. The stannous flouride in Crest attaches to the calcium compounds in tooth enamel, making the enamel stronger and more resistant to decay.

Recently, dental health specialists have become concerned with tartar, or dental calculus, as it is called. Tartar is caused by a gradual buildup of placque over time until it becomes thick and hard. Uncontrolled build-up of placque can produce a condition called gingivitis which is an inflammation or swelling of the gum tissue that surrounds the tooth. Other problems can also occur and may result in premature tooth loss. The scientists at Procter & Gamble decided that a toothpaste that would inhibit tartar formation would be very important.

Chemically, tartar is a calcium precipitate. A precipitate is a solid substance that forms from liquid solutions. Certain conditions are necessary for precipitates to form. If these conditions are not present or are altered, the precipitate will not form properly. Procter & Gamble scientists had to find a safe way to change the conditions in the mouth that allow tartar to form. First, the chemical structure of tartar was analyzed. Scientists must know how a chemical is constructed in order to find a way to attack it. A thorough search of various chemicals that would inhibit tartar formation was conducted. On the basis of safety factors, effectiveness and manufacturing cost, sodium pyrophosphate was chosen for more testing.

Sodium pyrophosphate fights tartar by a process known as chelation. A chelate is a compound in which the central atom (in this case, calcium) is attracted by two or more bonds, forming a surrounding structure.



*Chelators surround the positively charged calcium cation with weak negative charges. This suspends the calcium cation in solution and prevents or slows down its ability to combine with other materials.*

Normally, the tartar that forms on your teeth is a hard, calcium-containing deposit. When a toothpaste containing sodium pyrophosphate is used, the tartar that forms is weaker. It crumbles easily under the action of your toothbrush. How does sodium pyrophosphate make the tartar weaker? It forms chemical bonds with the calcium network in crystals of tartar, reducing the cross-linking bonds that would normally form. As we've seen, the tartar that forms is not nearly as strong. But there were many parts to the problem. In order to allow the active ingredient to spread evenly over the tooth surface, the right surfactant or spreading agent had to be formulated.

But was pyrophosphate safe to use? It was known that ingestion of certain chelating agents can lead to health problems in humans. Since millions of people would be using the new toothpaste, it was necessary to test the product to make sure it was absolutely safe for humans. This is an essential phase of all consumer product development at Procter & Gamble. Company policy states that products must be safe for their intended use and for cases of foreseeable misuse. After an extensive battery of safety tests, including animal tests, it was concluded that the new formulation was safe for human use.

The product was then tested in clinical trials supervised by scientists and dental care professionals, often in double blind studies. A "double blind" study is one in which the exact identity of the substance being tested is kept secret from both the participants and the researchers. In carefully controlled studies, various formulations containing sodium pyrophosphate proved effective in controlling tartar, reducing deposits by more than 44% in some cases. Participants in the study represented a cross-section of the population with regard to age, brushing habits and other factors.

Decisions regarding the flavor formulation were needed. Sodium pyrophosphate has a very salty taste. Several flavors were tried before one was found which masked the salty taste but which consumers did not find too strong. In 1985, Tartar Control Crest was first marketed. Its presence on an increasing number of toothbrushes daily is the result of a long chain of company decisions, many of them made with important information from scientists and researchers.

## Questions

1. When was the role of bacterial infection in tooth decay first discovered?

2. Why were clinical trials necessary to prove the effectiveness of sodium flouride and sodium pyrophosphate?

3. Why was the ADA endorsement of Crest in 1960 important?

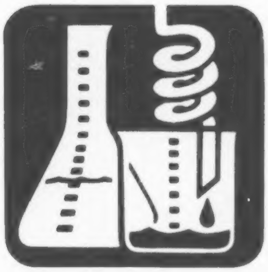
4. What is placque? What is its role in tooth decay?

5. What is tartar? What is its role in tooth decay?

6. What is a precipitate?

7. How does sodium pyrophosphate inhibit tartar formation?

8. What is a chelate?



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STUDENT
ACTIVITY

# Precipitation

## Purpose

The tartar that forms on the surface of your teeth is a chemical precipitate. This lab will help you investigate precipitates and the conditions under which they occur.

## Materials

per student team of 2-4:
copper sulfate, $CuSO_4 \cdot 5H_2O$, 0.1 M
household ammonia
household vinegar
1 test tube rack
4 small test tubes
pH paper or litmus paper
masking tape
marking pen
medicine dropper
straw or stirring rod

## Safety notes

**Wash your hands thoroughly before and after the activity. Do not touch the chemicals or bring them into contact with eyes, nose or mouth. Wear safety eyewear as directed by your teacher. Observe all warnings and cautions and methods of handling chemicals recommended on the bottles.**

## Procedure

Read the entire procedure through before starting. If you have any questions, ask your teacher. Make sure lab glassware is clean before using.

1. Use masking tape and a marking pen to label the test tubes 1-4.

2. Use the medicine dropper to add 20 drops of copper sulfate to each test tube. Rinse the medicine dropper thoroughly after use.

3. Use pH paper to test the pH of tubes 1-4. Record your observations in the data table.

4. Add 5 drops of household ammonia to test tubes 2, 3 and 4. What happens?

The solid that forms is called a precipitate. A precipitate is a solid that forms from two liquids. This particular precipitate is formed from ammonia and copper sulfate. Test the pH of the solution in test tubes 2-4 with pH paper or litmus paper. Record your observations in the data table.

5. Add 10 drops of household vinegar to test tube 3. Stir well to mix. Rinse the medicine dropper thoroughly after use. What happens?

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Test the pH of the solution using pH paper. If the precipitate still remains, add additional drops until it dissolves. (This should not require more than 10-15 more drops.) Record your observations in the data table.

6. Add 5 more drops of ammonia to test tube 4. Rinse the medicine dropper thoroughly after use. Stir well to mix. If the precipitate still remains, add additional drops until it dissolves. (This should not require more than 10-15 more drops.) Describe what happens.

Test the pH of the solution using pH paper. Record your observations in the data table. The dark blue color your observe is the result of the formation of a complex ion composed of copper and ammonia.

## Data table

| | test tube 1 | test tube 2 | test tube 3 | test tube 4 |
|---|---|---|---|---|
| color of solution before ammonia is added | | | | |
| pH before ammonia is added | | | | |
| color of solution after ammonia is added (tubes 2, 3, 4) | | | | |
| pH after ammonia is added (tubes 2, 3, 4) | | | | |
| pH after vinegar is added (tube 3) | | | | |
| pH after excess ammonia is added (tube 4) | | | | |

## Questions

1. What was the purpose of test tube 1?

2. What is a precipitate?

3. What is the effect of vinegar on the precipitate in test tube 3?

4. What is the effect of excess ammonia on the precipitate in test tube 4?

5. Can you make a general statement about the effects of pH on the precipitate in this activity?

6. In the student reading you learned that Tartar Control Crest changes the chemical composition of tartar. How does this help prevent tartar from forming? How does this activity show that precipitates can be affected by changing conditions?

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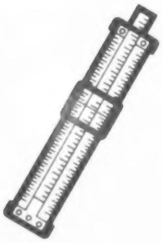
STUDENT
READING

# Risk

The public has come to expect and demand "no-risk" consumer products. By conservative estimates, various consumer products are used by Americans, directly or indirectly, hundreds of millions of times daily. Soap and detergent products alone account for a significant part of this total because they are used in bathing, laundering, dishwashing and any number of household cleaning chores. Making sure the chemical formulations in these products are safe is a major concern of manufacturers like Procter & Gamble.

Let's think about the "no risk" concept for a moment. Certainly no one really wants high levels of risk. We are taught from an early age to avoid risks — to look both ways before we cross the street, for example. Major companies like Procter & Gamble spend a great deal of time, money and effort reducing risks. Detergents aren't supposed to be eaten or splashed in the eyes, but experience has shown that young children are prone to these kinds of accidents. If a product designed for laundering clothes is used instead for washing dishes, what kinds of risks might there be in using dishes that are not rinsed properly? Can detergent formulations be found that will never cause a mild skin irritation to anyone?

The notion of "zero risk" is an attractive one. It is hard to be objective where risks and human life are concerned. If you will think about it for a moment, you will realize that all actions involve risks of some kind. We all take risks everyday. Some of us choose to risk our health for elective surgical procedures — for improved vision, for a more youthful appearance or for other benefits. Most of the time, our risk-taking is almost instinctive. We use an old chair to reach that box on the top shelf instead of getting a ladder, or play contact sports without safety equipment. We might even risk our own life trying to save a drowning child. Even when we take the time to think, sometimes our analysis of various risks is quite irrational. We worry about cancer from saccharin in diet food and drinks, but continue to puff away at cigarettes while riding in an automobile without fastening our safety belts.



We assume many risks without much thought because they involve personal choice and appeal to us in some way — driving a car, skateboarding, climbing a tree. These are called voluntary risks. Risks that are forced upon us are called involuntary risks and generally make us uneasy. A familiar example is travel by automobile and by commercial airplane. Driving to the airport behind the wheel of a car, we feel somehow more safe than on board the jet where the captain has the wheel — even though we know traveling by airplane is statistically much safer than traveling in an automobile.

The media has a role in our perception of risk. Diseases such as diabetes, heart disease and cancer take about 16 times the number of lives each year as do accidents at home or in the workplace, yet in one study involving areas in Massachusetts and Oregon, there were more than six times more newspaper articles written about accidental deaths than articles written about those major diseases. This kind of "victim-oriented" reporting tends to leave us all with a vague dread about such things as the next earthquake, lead poisoning, cancer risk of X-rays, dioxin, jet crashes, chemicals in our food, water and air and dozens of others.

Besides media attention, many other factors affect our perception and judgment of risk. One of these is our familiarity with the risk and whether the risk is well understood. We tend to underestimate the risks of everyday actions because we perform them routinely. Risks that are highly technical in nature or require specialized knowledge — such as the risks of a new medical procedure — tend to be harder for us to judge and compare. Another factor is our perception of the benefits of the risk. Some of us might say that a risk that has a highly desirable outcome is worth taking, as in the case of a patient with a terminal illness who volunteers for an experimental medical treatment.

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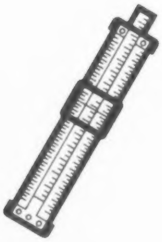
Still another factor is whether the risk is voluntary (our choice) or involuntary (forced on us), as mentioned earlier. Another factor is whether we perceive the risk to be shared equally by all involved. The 100 people who share a risk equally that all might benefit will feel differently than another group of 100 people who share the same risk if only 2 persons from the group might benefit. Finally, there is the catastrophic potential of the risk — whether a large number of people might be injured or lose their lives in a single incident, such as from an airplane crash.

A town meeting held to discuss the possibility of locating a nuclear power plant outside the town provides an opportunity to see many of these factors at work. Citizens who attend the meeting may complain of a lack of basic understanding of nuclear technology, remarking that this knowledge is not familiar to many (if not all) of the residents. They may say they were not consulted early in the review process and therefore have not had sufficient time or opportunities to make their opinions known. They may declare that the potential for accidents leading to major disasters at nuclear power plant is known to all who attend movies. They may say that the risk is distributed unfairly — people who live a great distance away from the plant will be able to use the electricity with minimal risk.

Actually, from a risk standpoint, nuclear reactors in this country are quite safe. Accidents in nuclear power plants have claimed just 3 lives in the United States over the last 30 years.

Risks of different types can be compared statistically. This adds perspective to an otherwise unfamiliar situation. For example, the risk of cancer from pesticides in food is less than the cancer risk from chlorine in the water you drink; both of these risks are about three times less than the risk of being killed by lightning. Comparing dissimilar risks has been likened to comparing apples and oranges. The risk of being killed by lightning has no relation to the risk of cancer from pesticide residues, but it is helpful to compare risks using a standard measure. The standard measure compares the risk of death from a hazard for one person compared with one million persons exposed to the same hazard. Your teacher will share with you some information regarding "one in a million" risks.



The point of risk comparison and risk-benefit analysis is to give an objective look at the risks involved in terms of the benefits of the activity concerned. Preservatives are used in processed foods because the health-associated risks of spoiled food outweigh those associated with the use of preservatives. The risk from pesticides is 100 times less than the risk from natural carcinogens (cancer-causing agents) in a raw mushroom and thousands of times less than the natural carcinogens in wine or beer. Part of the public's confusion and concern can be traced to a heightened environmental awareness conveyed by our sophisticated laboratory methods. We can now detect substances at concentration levels of parts per quadrillion — one drop of dishwashing detergent dissolved in enough water to fill a string of railroad tank cars 10,000 miles long! In fact, it is much easier to detect the mere presence of a chemical than to tell whether the chemical is safe.

Technology is often blamed for today's problems. But technology has had a hand in curing many problems, too. Many people think life today is somehow more dangerous, more difficult and more hazardous than life in the past even though we live much longer and are generally healthier and freer from disease than at any other time in our history! In 1907, 20% of all people died before they reached age 15 — by 1987 the 20% age-death figure had increased to more than 59 years. Babies born today generally enjoy a much longer, healthier life than was possible in 1907, when 1 in 10 babies did not live past its first year. The average life expectancy in Japan and other highly industrialized countries such as the United States and most of western Europe is about 71 years; in developing nations such as Africa's Ivory Coast, it's less than 50 years.

All of us experience risk on a daily basis. By understanding more about risk, we are able to make more informed choices about the risks that really matter and spend less time, money and energy over risks we need not worry about.

## Questions

1. Is a "no risk" concept a sound one? Is it possible? Explain your answer.

2. What are a few common risks we might take everyday?

3. What is the difference between voluntary and involuntary risks?

4. What is the role of the media in our understanding of risk?

5. Name some of the other factors that influence the perception of risk and give an example of how each factor might influence its perception.

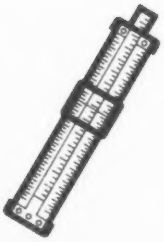
6. How is it possible to compare risks of different types?

7. Name an activity that might increase the chance of death by two in a million. By three in a million. By four in a million.

8. How does our sophisticated technology affect our perception of risk?

9. Is life more risky today than 75 years ago? Explain.

10. Why take the time to be informed about risk?



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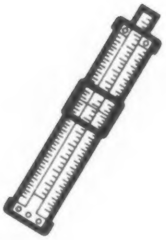
# Risk

Rank the following annual risks of death in the United States from 1 to 15, with 1 indicating the highest risk of death, 2 the second highest risk and so on. When you have finished, your teacher will list the actual numbers and discuss them with you.

## Annual Risk of Death in the United States

| Your rank | Actual Rank | Hazard |
|---|---|---|
| | | accidental falls |
| | | accidental poisoning |
| | | cancer |
| | | commercial aviation accidents |
| | | drowning |
| | | fires, burns |
| | | heart disease |
| | | homicides (being murdered) |
| | | hunting accidents |
| | | lightning |
| | | motor vehicle accidents |
| | | struck by meteorites |
| | | suffocation, choking |
| | | tornadoes |
| | | work accidents |



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STUDENT
READING

# Toxicity

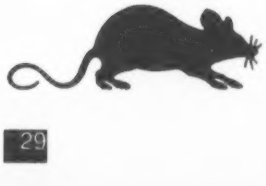
Toxicology is the study of toxic properties of substances. Toxicologists concern themselves with the harmful effects of chemicals in our lives. For many of us, the word "chemical" has a negative meaning so that "toxic chemical" is a redundancy. However, all chemicals can have toxic effects. Toxic effects depend on a number of factors. One of these is the dose. A two-year old child can swallow one teaspoon of salt safely, but 10 teaspoons might kill the child. Another of these factors is the route of exposure — the way the chemical enters the human body. This is generally by mouth, through the skin or through the lungs. Furniture polish accidentally sprayed on the skin may have no toxic effects. The same polish may be very toxic if taken into the mouth or lungs. Other factors which relate to toxicity include frequency and duration of exposure — how often one is exposed to a chemical and the length of time one is exposed — and the toxicity, or harmful effects of the chemical itself.

It is a popular view that natural chemicals are nontoxic. Actually, natural toxins far outnumber those made by humans. Some of the most toxic substances in the world are natural. For example, botulin is produced by bacteria which cause food poisoning. One gram (1/28 of an ounce) of botulin can kill 20 million mice; the lethal human dose of botulin is estimated to be 1/14 millionth of an ounce. It is estimated that the number of natural substances that can cause cancer is far larger than the number of synthetic substances that do.

Many of you might feel that a chemical — whether natural or synthetic — is either poisonous or it is not. This is not the case. In low doses DDD, a potent insecticide, is effective for treating certain forms of adrenal cancer. Coumarin compounds are excellent rodenticides (agents that kill or repel rodents), but they are also valuable drugs used to prevent blood from clotting. The toxicity of these compounds is the same whether used as a drug or as a pesticide. Legally a poison is defined as a substance which has a lethal dose of 50 mg or less per kilogram of body weight. This is about 3/4 of a teaspoon for adults and about 1/8 teaspoon for a two-year-old child. There are very few chemicals that are lethal in such small quantities. Even the majority of synthetic pesticides are not this toxic.

But how do toxicologists and other scientists determine the toxicity of a chemical? What methods are involved? What are the limits of these methods? How can these methods be improved to provide more accurate and reliable information? Toxicologists evaluating the safety of a new chemical or formulation first refer to computer data bases, scientific journals and books to determine whether anyone else has examined the effects of the chemical or formulation. It is often helpful to know the effects of similar chemicals. If no information is available, the toxicologist places the chemical into appropriate testing, including tests using animals and tests using non-living organisms such as cell and tissue cultures. Early stages of the testing procedure may involve the use of bacterial cultures to detect any tendency of the chemical to cause mutations which might lead to cancer.

Often the effects of a particular chemical on humans can not be reliably predicted by such methods and tests using animals are required. Over 90% of all animals used in testing are rodents, especially bred for this purpose. Scientists in most responsible major consumer product companies are committed to searching for alternatives to animal testing. The problem with many of these alternative tests is that they do not reliably predict the effects of chemicals on humans. Thus they are not usable for safety evaluation and are not accepted by the government agencies such as the Food and Drug Administration. The Procter & Gamble Company is committed to a policy which emphasizes using animals in testing only when no alternatives exist. The policy calls for the highest ethical standard of care. Company scientists constantly seek ways to reduce the total number of animals used, to



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use fewer animals per test, or to replace these animal tests with non-animal tests.

Toxicologists need to determine the level at which a particular chemical has an effect on a living system. This is called the threshold limit value and is one of the basic concepts of toxicity. Individuals vary widely in their responses to chemicals. Some people require only one tablet of aspirin to cure a headache. Some need two or three. Different people have different tolerances for alcohol. Ten mg/kg of parathion, an extremely toxic insecticide, will kill about 1/2 of all rats receiving the dose. But 1/2 of the rats will live. These differences make it hard to determine safe levels of chemicals in our lives. For example, there is a threshold at which a chemical might be effective as a food preservative because it kills bacteria that spoil food. There is also a threshold at which the same chemical might be harmful to humans, causing illness. A toxicologist compares the two values to determine whether the chemical has any real value as a food preservative. If the chemical is effective as a food preservative only at concentrations harmful to humans, it will not be used.

In order to make a complete safety evaluation, toxicologists must investigate both the short-term and long-term effects of exposure. Short-term exposures are called acute effects. Examples of short-term exposures are accidental chemical spills at a factory or the accidental ingestion of a consumer product by a small child. These effects differ from the long-term effects of exposure, called chronic effects. An example of chronic toxicity is the danger of working for many years in an office where other people are smoking.

Some chemicals are very toxic acutely but have no chronic toxic effects in small amounts. They may even be essential. Vitamin D is such a chemical. It has an acute oral toxicity of 10 mg/kg, yet all of us need a dose about one thousand times smaller daily to maintain good health. Vitamin D deficiency results in rickets, and severe deficiency can cause death. If vitamin D were not exempted from the Hazardous Substances Labeling Act since it is a food (in milk) or a drug (as a vitamin), it would be required to carry a poison label. Metallic mercury has no acute oral toxicity; however, chronic exposure to mercury vapors is extremely hazardous to human health. If a child breaks a thermometer, the concern should not be whether any mercury was swallowed, but whether any spilled on the carpet or was ground into the fibers from which it could vaporize slowly.

To predict the long-term or chronic effects of low levels of chemicals in humans, we must test higher levels of the chemical for shorter periods of time. Tests which last for 30 years would be too expensive or impractical. The chronic oral effects of the artificial sweetener saccharin were estimated by giving massive doses to laboratory rodents over a two year period. Public outcry resulted over the disclosure that humans would have to drink 50,000 cans of diet soda in one day to obtain a similar dosage!

In the United States today, we interact with a staggering variety and number of chemicals as a normal part of our daily routine. We take over-the-counter and prescription medication and use a wide variety of consumer products without giving safety a second thought. The knowledge of toxicologists about the line between beneficial and toxic effects of chemicals makes this possible.

## Questions

1. Name the five factors that influence toxicity and give a brief example.

2. What is the difference between synthetic and natural chemicals?

3. What is the chemical definition of "poison"?

4. Can chemicals which are poisons have beneficial uses? Give an example.

5. Name some early steps in the safety evaluation of a new chemical.

6. What is the threshold limit value? Why is it important?

7. What is acute toxicity? Give an example of why it might be important to know the acute toxicity of a chemical.

8. What is chronic toxicity? Give an example of why it might be important to know the chronic toxicity of a chemical.

9. Describe the problems in determining the chronic toxicity of a chemical.

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STUDENT
ACTIVITY

# Tartar Control Crest

## Purpose

To determine a taste threshold for Tartar Control Crest

## Materials

for the class:
1 tube of Tartar Control Crest

per student team of 2-4:
ruler
Q-tips, 4 per student
5 plastic cups (cups should hold 8 ounces)
tap water
wax paper, 2" x 4" sheet
felt tipped marker
plastic spoon
pencil
graduated cylinder, 50 ml

## Safety notes

**Do not taste any materials in the lab without permission from your teacher. Wash your hands thoroughly before and after the activity. Make sure lab glassware, especially the graduated cylinder, is clean before using.**

## Procedure

Read the entire procedure before starting. Ask your teacher if you have any questions.

1. Use a clean graduated cylinder to measure 5 ml of tap water. Put the water in one of the plastic cups and use the felt-tipped pen to mark a line at the water level. Repeat this procedure with 45 ml of water. You now have a graduated cup with two lines, one at 5 ml and one at 45 ml.

2. Number the remaining four plastics cups 1-4.

3. With your ruler and pencil, mark a line 6 1/2 cm long on a piece of paper. Put the piece of wax paper over the line. Squeeze out a ribbon of toothpaste as long as the pencil line.

4. Use the plastic spoon to transfer the toothpaste to cup 1. Use your graduated cup to add 45 ml of tap water to the toothpaste and stir to mix well. If toothpaste is considered full strength, then the cup 1 contains a 10% solution, by weight, of toothpaste and water. This is 1 part in 10.

5. Using the graduated cup, pour 5 ml of the solution from cup 1 into cup 2. Add 45 ml of tap water. Stir to mix well. This is a 1% solution of toothpaste and water, or 1 part in 100.

6. Using the graduated cup, pour 5 ml of the solution from cup 2 into cup 3. Add 45 ml of tap water. Stir to mix well. This is a 1/10% solution of toothpaste and water, or 1 part in 1,000.

7. Using the graduated cup, pour 5 ml of the solution from cup 3 into cup 4. Add 45 ml of tap water. Stir to mix well. This is a 1/100% solution of toothpaste and water, or 1 part in 10,000.

8. You are now ready to determine your taste threshold for Tartar Control Crest. Use a Q-tip to transfer a small amount of the solution in cup 4 to your tongue. Can you taste the toothpaste?

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9. Rinse your mouth with a little tap water and try some from cup 3. Use different Q-tips to repeat the procedure with mixtures from the other cups. Record the number of the cup in which you could first taste Tartar Control Crest.

Cup in which I could first taste Tartar Control Crest ________.

10. Report your results to your teacher.

## Questions

1. What was the number of the cup in which you could first taste the Tartar Control Crest?

2. Was this the same as for all the members in your group? _________ Was this the same as for all the members in your class?

3. How do you explain any differences in a person's ability to taste Tartar Control Crest?

4. The taste buds in your mouth react to the different chemical molecules that give Tartar Control Crest its flavor. Does the evidence you have obtained in this activity support the conclusion that all people react to chemicals in exactly the same way? Explain your answer.

STUDENT
ACTIVITY

# Lifetime Ingestion of Toothpaste

Each time you brush your teeth, you swallow a tiny amount — even if you are very careful. How much toothpaste will you swallow in your lifetime? Here's a worksheet to help you find out! We assume a few things to make the calculations easier. If you need help, ask your teacher. Calculators are permitted!

1. How many times do you brush your teeth daily?
   (If your brushing habits vary, report the average value.)

   I brush ______ times a day.

2. Multiply this number by 365 (the number of days in a year).

   I will brush _______ times in a year.

3. Multiply your answer to step 3 by 66 if you are male, by 72 if you are female. These are the average life expectancies for your age group, according to sex, adjusted for the lack of regular brushing habits for the first two years of your life. (Source: U.S. Bureau of Census, 1988)

   I will brush _______ times in my life.

4. Multiply your answer to step 3 by .05. This is the number of grams of toothpaste you swallow each time you brush. This is an average amount, taking into account the fact that young children swallow more toothpaste than adults.

   I will swallow ___________ grams of toothpaste in my life.

5. The family-size tube of Tartar Control Crest is 6.4 ounces or 182.4 grams. Divide the number of grams (step 4) by 182.4 to find out the number of tubes of toothpaste you will swallow in your life.

   I will swallow ___________ tubes of toothpaste in my life.

6. Compare your answers to those of your classmates. Is there much difference?

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STUDENT ACTIVITY

# Paper Chromatography

## Overview

You will use paper chromatography to separate and identify various pigments. You will understand how related techniques can be used to detect and identify very small amounts of chemicals in the environment.

## Time required

One class period

## Materials

per student team of 2-4:
3-4 strips of chromatographic paper, 3/4" x 3 1/2" (can be cut from coffee filter paper)
250 ml beaker or similar container
food coloring or different colored water soluble markers
hand lens
paper clip
toothpicks
tap water

## Safety notes

**Do not bring materials into contact with eyes, mouth or skin. Wash your hands thoroughly after the activity. Wear safety eyewear as directed by your teacher.**

## Procedure

1. Cut several pieces of chromatographic paper about 3 1/2" long. If using filter paper or similar substitute, trim to a finished size of about 3 1/2" x 3/4".

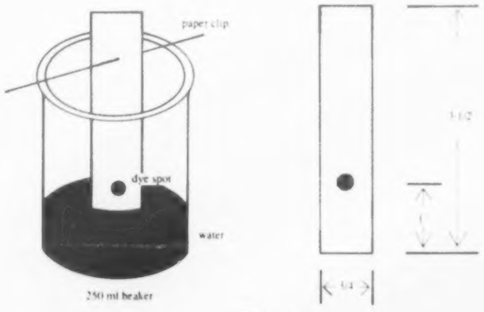
2. Use the flat end of a toothpick to put a drop of food coloring on a piece of chromatographic paper about 1" from the bottom as shown in the drawing.

3. Assemble the other equipment as shown in the drawing.

4. Use enough water to cover just the bottom of the beaker. Lower the paper into place and use a straightened paper clip to poke a small hole in the paper strip. Lower the paper strip into the water.

5. The water will move up the strip, dissolving and carrying the dye spot with it. Try various individual food colors and combinations. Next, try water soluble markers — black works well because it is a mixture of all colors. You will see each different component color separate as the water moves up the strip.

6. Allow the marks almost to reach the paper clip, then remove and allow to dry. Trim the finished prints and save.



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## Questions

1. Did you notice this process causes some colors to separate, forming other colors? What is your explanation for this?

2. Why does the water move up the strip? Why does it bring the dye along with it?

3. How is paper chromatography similar to gas chromatography, another analytical procedure used by scientists to detect small residues of chemicals in the environment? How is it different?

STUDENT READING

# Environmental Safety

## Research "Beyond the Drain"

"Most things I use in my home eventually go down the drain," is a remark many of us might make. This remark is more accurate than we realize. Many common consumer products, from detergents to cosmetics, will ultimately be washed down the drain. With today's increased awareness comes increased concern for the environment. Just how do we know the consumer products on which we have come to rely are safe for the environment? The Environmental Safety Division of Procter & Gamble has been seeking to provide answers to this question for years. Scientists of many different fields — analytical chemists, chemical engineers, microbiologists and aquatic toxicologists — work to discover the fate of consumer products after they have been used and disposed of "down the drain."

Many of us have come to think of "environmental safety" in terms of safety to a river or stream. Gradually, the term is taking on a new meaning, one much larger in scope. Safety to workers, to the consumer and to the environment are now all included under the larger umbrella of environmental safety. Researchers ask many questions about compounds used in consumer products. Are expected concentrations of products likely to cause problems for the environment? Will the products biodegrade (break down) easily? Are the products of biodegradation also safe? What will be the effects on sewage treatment facilities? Will sensitive animal and plant life be affected?

These questions are not easily answered. Tests on the environment are extremely difficult — chiefly because of the uncertainty in applying the results of a laboratory test to the natural world. In the laboratory, scientists have a great deal of control compared with the level of control possible in nature. Unseasonably heavy rainfall may dilute the concentration of detergent in a stream. The same heavy rainfall may stir up mud or other sediments from the stream bed. This may affect plant and animal life in an unpredictable manner. As if this weren't enough, ecosystems are dynamic — constantly changing in many ways. Chemicals may interact in the environment in different ways than laboratory investigations might have indicated.

The story of chloroflourocarbons (CFCs) paints a picture of the environment as a complex, often unpredictable laboratory. CFCs were first synthesized many years ago by scientists investigating possible substitutes for ammonia, then used in refrigeration. Ammonia can be highly toxic and dangerous under pressure. CFCs have many desirable properties. They are stable (do not degrade under normal conditions), are non-corrosive and non-toxic. They were used in aerosol sprays, in home and industrial refrigeration and automobile air conditioners, and as solvents for various industrial processes, such as cleaning silicon wafers for microchips for personal computers.

As CFC use increased, so did concerns over their possible role in reducing concentrations of atmospheric ozone. A layer of ozone located high in the upper atmosphere, absorbs some of the harmful ultraviolet radiation from the sun. It was suspected that CFCs might interfere with this process. Gradually, enough evidence accumulated to indicate that the "miracle molecules" were depleting the ozone in the upper atmosphere. This came as a complete surprise to scientists who had failed to predict it despite exhaustive screening and testing procedures. The United States has banned certain uses of CFCs, and many U.S. industries plan to phase out much CFC use by the mid-1990s.

Another example involves the use of alkyl benzene sulfonate (ABS). This material is used as a surfactant, or spreader, in some detergents. Laboratory tests indicated no problem with the material. However, in the waste water stream it caused excessive foaming. This foaming was traced to the highly branched, complex chemical structure of the ABS molecules. Later, linear alkyl benzene sulfonates (LABS) were substituted and the foaming ceased to be a problem.

When environmental testing of a Procter & Gamble consumer product is conducted, several separate tests of individual components of a formulation may be performed. For example, if the product to be tested is a synthetic detergent, the surfactant, or "spreader," builder, whiteners and soil suspending agents may all require separate testing. A key determination in any kind of environmental testing involves the prediction of concentration levels in nature and monitoring to make sure these predictions are realized.

A biodegradability test to determine whether living organisms can safely break down larger molecules in the product to smaller molecules requires about 26 days. Over 60% of all testing measures biodegradability in some manner. Of interest to scientists are short-term (acute) and long-term (chronic) toxicity data on various aquatic organisms such as trout, minnows, daphnia (small pond organisms) and algae. These are selected because by studying them scientists can predict how other plants and animals might behave. Other tests of the aquatic environment involve pH, water temperature, dissolved oxygen, dissolved solids and specific ion concentration.
As various consumer products are tested, vital basic information about the environment is discovered. For example, in the 1970s there was concern that phosphates in detergents might lead to uncontrolled growth of algae. This led to several studies of lakes and rivers. Procter & Gamble researchers proved that detergent phosphates could be used by algae. They also proved that other sources of phosphates, including human wastes and fertilizers, could make the algae grow. Since complete environmental safety testing for an important ingredient can cost hundreds of thousands of dollars, scientists are always seeking shorter, less expensive methods that do not sacrifice reliability. One test previously used to measure the long-term effects of detergents involved months of study. A newer version of the test requires just five days. It uses the respiratory rate of bluegills to test the toxicity of heavy metal ions and pesticides.

In other instances, the concern might not be the product itself, but the possible impact of the industrial process required to make the product. Detergent granules for products such as Tide and Oxydol are produced by passing a stream of liquid through a column of heated air several stories tall. As the liquid cools and solidifies, it turns into granules which are then packaged for distribution. The hot air needed for this process is provided by coal-burning furnaces. Virtually all the ash and over 90% of the sulfur is removed from the smokestacks by a combination of scrubbers and electrostatic precipitators.

Various analytical methods, including gas chromatographs, computer models and mathematical techniques are used more often these days by Procter & Gamble researchers. Gas chromatography separates compounds based on their molecular structure — using principles similar to those of paper chromatography, a technique used in many junior and senior high school science classes. However, gas chromatography uses heated gases to accomplish this separation instead of various liquids used in paper chromatography. Computer models are helpful in understanding the complex relationships that exist on the environment. One such computer data base contains information on the flow rate of all major rivers in the United States at selected cities and other points along their banks! Using various computer models with actual field test techniques allows reasonably accurate forecasts of the environmental fate of consumer products.

Procter & Gamble's concern for human and environmental safety matches its concern for the high quality and performance of its products. This concern leads the company to track the environmental fate of these products "beyond the drain." Preserving environmental quality is a corporate responsibility which Procter & Gamble has accepted in the past and will continue to accept in the future.

## Questions

1. What is meant by environmental safety?

2. What kinds of questions do researchers ask about the environmental safety of a material?

3. What are some difficulties involved with environmental safety testing?

4. How does the chloroflourocarbon (CFC) story provide an example of the difficulty of predicting the environmental fate of various chemicals?

5. Why are biodegradability tests so important?

6. Is environmental safety testing inexpensive and easy? Give an example to support your answer.

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# CONSTITUTION OF THE UNITED STATES OF AMERICA

## PREAMBLE

WE THE PEOPLE of the United States, in order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defence, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this CONSTITUTION for the United States of America.

***Explanatory note:***
*Bracketed numbers were inserted by the editor. Brackets in the body of the document indicate the enclosed portion was superseded or modified by amendment.*

## ARTICLE I

## LEGISLATIVE DEPARTMENT

### Section 1. [Legislative powers vested in Congress.]

All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

### Sec. 2. [House of Representatives.]

[1.] The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for Electors of the most numerous Branch of the State Legislature.

[2.] No Person shall be a Representative who shall not have attained to the Age of Twenty five Years, and been seven Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State in which he shall be chosen.

[3.] [Representatives and direct Taxes shall be apportioned among the several States which may be included within this Union, according to their respective Numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three fifths of all other persons.] The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct. The Number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at Least one Representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to chuse three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

[4.] When vacancies happen in the Representation from any State, the Executive Authority thereof shall issue Writs of Election to fill such Vacancies.

[5.] The House of Representatives shall chuse their Speaker and other Officers; and shall have the sole Power of Impeachment.

### Sec. 3. [Senate.]

[1.] [The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof, for six Years; and each Senator shall have one vote.]

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[2.] Immediately after they shall be assembled in Consequence of the first Election, they shall be divided as equally as may be into three Classes. The Seats of the Senators of the first Class shall be vacated at the Expiration of the second Year, of the second Class at the Expiration of the fourth Year, and the third Class at the Expiration of the sixth Year, so that one third may be chosen every second Year; [and if Vacancies happen by Resignation, or otherwise, during the Recess of the Legislature of any State, the Executive thereof may make temporary Appointments until the next Meeting of the Legislature, which shall then fill such Vacancies].

[3.] No Person shall be a Senator who shall not have attained to the Age of thirty years, and been nine Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State for which he shall be chosen.

[4.] The Vice President of the United States shall be President of the Senate, but shall have no Vote, unless they be equally divided.

[5.] The Senate shall chuse their other Officers, and also a President pro tempore, in the Absence of the Vice President, or when he shall exercise the Office of President of the United States.

[6.] The Senate shall have the sole Power to try all Impeachments. When sitting for that Purpose, they shall be on Oath or Affirmation. When the President of the United States is tried, the Chief Justice shall preside: and no Person shall be convicted without the Concurrence of two thirds of the Members present.

[7.] Judgment in Cases of Impeachment shall not extend further than to removal from Office, and disqualification to hold and enjoy any Office of honor, Trust or profit under the United States: but the Party convicted shall nevertheless be liable and subject to Indictment, Trial, Judgment and Punishment, according to Law.

### Sec. 4. [Election of members--Sessions.]

[1.] The Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by Law make or alter such Regulations, except as to the Places of chusing Senators.

[2.] The Congress shall assemble at least once in every Year, and such Meeting shall be on the [first Monday in December], unless they shall by Law appoint a different Day.

### Sec. 5. [Organization--Proceedings--Adjournment.]

[1.] Each House shall be the Judge of the Elections, Returns and Qualifications of its own Members, and a Majority of each shall constitute a Quorum to do Business; but a smaller Number may adjourn from day to day, and may be authorized to compel the Attendance of absent Members, in such Manner, and under such Penalties as each House may provide.

[2.] Each House may determine the Rules of its Proceedings, punish its Members for disorderly Behavior, and, with the Concurrence of two thirds, expel a Member.

[3.] Each House shall keep a Journal of its Proceedings, and from time to time publish the same, excepting such Parts as may in their Judgment require Secrecy; and the Yeas and Nays of the Members of either House on any question shall, at the Desire of one fifth of those Present, be entered on the Journal.

[4.] Neither House, during the Session of Congress, shall, without the Consent of the other, adjourn for more than three days, nor to any other Place than that in which the two Houses shall be sitting.

### Sec. 6. [Compensation--Privileges--Holding other office.]

[1.] The Senators and Representatives shall receive a Compensation for their Services, to be ascertained by Law, and paid out of the Treasury of the United States. They shall in all Cases, except Treason, Felony and Breach of the Peace, be privileged from Arrest during their Attendance at the Session of their Respective Houses, and in going to and returning from the same; and for any

Speech or Debate in either House, they shall not be questioned in any other Place.

[2.] No Senator or Representative shall, during the Time for which he was elected, be appointed to any civil Office under the Authority of the United States, which shall have been created, or the Emoluments whereof shall have been encreased during such time; and no Person holding any Office under the United States, shall be a Member of either House during his Continuance in Office.

### Sec. 7. [Bills and resolutions--Veto.]

[1.] All Bills for raising Revenue shall originate in the House of Representatives; but the Senate may propose or concur with Amendments as on other Bills.

[2.] Every bill which shall have passed the House of Representatives and the Senate, shall, before it become a Law, be presented to the President of the United States; If he approve he shall sign it, but if not he shall return it, with his Objections to that House in which it shall have originated, who shall enter the Objections at large on their Journal, and proceed to reconsider it. If after such Reconsideration two thirds of that House shall agree to pass the Bill, it shall be sent, together with the Objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a Law. But in all such Cases the Votes of both Houses shall be determined by Yeas and Nays, and the Names of the Persons voting for and against the Bill shall be entered on the Journal of each House respectively. If any Bill shall not be returned by the President within ten Days (Sundays excepted) after it shall have been presented to him, the Same shall be a Law, in like Manner as if he had signed it, unless the Congress by their Adjournment prevent its Return, in which Case it shall not be a law.

[3.] Every Order, Resolution, or Vote to which the Concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States; and before the Same shall take Effect, shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the Rules and Limitations prescribed in the Case of a Bill.

### Sec. 8. [Powers of Congress.]

**[1.] The Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises, to pay the Debts and provide for the common Defence and general Welfare of the United States; but all Duties, Imposts and Excises shall be uniform throughout the United States.**

**[2.] To borrow Money on the credit of the United States.**

**[3.] To regulate Commerce with foreign Nations, and among the several States, and with the Indian tribes.**

**[4.] To establish an uniform Rule of Naturalization and uniform Laws on the subject of Bankruptcies throughout the United States.**

**[5.] To coin Money, regulate the Value thereof, and of foreign Coin, and fix the Standard of Weights and Measures.**

**[6.] To provide for the Punishment of counterfeiting the Securities and current Coin of the United States.**

**[7.] To establish Post Offices and post Roads.**

**[8.] To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.**

[9.] To constitute Tribunals inferior to the supreme Court.

[10.] To define and punish Piracies and Felonies committed on the high Seas, and Offences against the Law of Nations.

[11.] To declare War, grant Letters of Marque and Reprisal, and make Rules concerning Captures of Land and Water.

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[12.] To raise and support Armies, but no Appropriation of Money to that Use shall be for a longer Term than two Years.

[13.] To provide and maintain a Navy.

[14.] To make Rules for the Government and Regulation of the land and naval Forces.

[15.] To provide for calling forth the Militia to execute the Laws of the Union, suppress Insurrections and repel Invasions.

[16.] To provide for organizing, arming, and disciplining the Militia, and for governing such Part of them as may be employed in the Service of the United States, reserving to the States respectively, the Appointment of the Officers, and the Authority of training the Militia according to the discipline prescribed by Congress.

[17.] To exercise exclusive Legislation in all Cases whatsoever, over such District (not exceeding ten Miles square) as may, by Cession of particular States, and the Acceptance of Congress, become the Seat of the Government of the United States, and to exercise like Authority over all Places purchased by the Consent of the Legislature of the States in which the Same shall be, for the Erection of Forts, Magazines, Arsenals, Dock-Yards, and other needful Buildings. And,

**[18.] To make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers, and all other Powers vested by this Constitution in the Government of the United States, or in any Department or Officer thereof.**

### Sec. 9. [Powers denied Congress.]

[1.] The Migration or Importation of such Persons as any of the States now existing shall think proper to admit, shall not be prohibited by the Congress prior to the Year one thousand eight hundred and eight, but a Tax or duty may be imposed on such Importation, not exceeding ten dollars for each Person.

[2.] The Privilege of the Writ of Habeas Corpus shall not be suspended, unless when in Cases of Rebellion or Invasion the public Safety may require it.

[3.] No Bill of Attainder or ex post facto Law shall be passed.

**[4.] No Capitation, or other direct, Tax shall be laid, unless in Proportion to the Census or Enumeration herein before directed to be taken.**

**[5.] No Tax or Duty shall be laid on Articles exported from any State.**

**[6.] No Preference shall be given by any Regulation of Commerce or Revenue to the Ports of one State over those of another: nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another.**

**[7.] No Money shall be drawn from the Treasury, but in Consequence of Appropriations made by Law; and a regular Statement and Account of the Receipts and Expenditures of all public Money shall be published from time to time.**

[8.] No Title of Nobility shall be granted by the United States: and no Person holding any Office of Profit or Trust under them, shall, without the Consent of the Congress, accept of any present, Emolument, Office, or Title, of any kind whatever, from any King, Prince, or foreign State.

### Sec. 10. [Powers denied the states.]

[1.] No State shall enter into any Treaty, Alliance, or Confederation; grant Letters of Marque and Reprisal; **coin Money; emit Bills of Credit; make any thing but gold and silver Coin a Tender in Payment of Debts;** pass any Bill of Attainder, ex post facto Law, **or Law impairing the Obligation of Contracts,** or grant any Title of Nobility.

**[2.] No State shall, without the Consent of the Congress, lay any Imposts of Duties on Imports or Exports, except what may be absolutely necessary for executing its inspection Laws; and the net Produce of all Duties and Imposts, laid by any State on Imports or Exports, shall be for the Use of the Treasury of the United States; and all such Laws shall be subject to Revision and Controul of the Congress.**

[3.] No State shall, without the Consent of Congress, lay any Duty of Tonnage, keep Troops, or Ships of War in time of Peace, enter into any Agreement or Compact with another State, or with a foreign Power, or engage in War, unless actually invaded, or in such imminent Danger as will not admit of delay.

## ARTICLE II

## EXECUTIVE DEPARTMENT

### Section 1. [The President.]

[1.] The executive Power shall be vested in a President of the United States of America. He shall hold his Office during the Term of four Years, and, together with the Vice President, chosen for the same Term, be elected, as follows:

[2.] Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress: but no Senator or Representative, or Person holding an Office of Trust or Profit under the United States, shall be appointed an Elector.

[3.] [The Electors shall meet in their respective States, and vote by Ballot for two Persons, of whom one at least shall not be an Inhabitant of the same State with themselves. And they shall make a List of all the Persons voted for, and of the Number of Votes for each; which List they shall sign and certify, and transmit sealed to the Seat of the Government of the United States, directed to the President of the Senate. The President of the Senate shall, in the Presence of the Senate and House of Representatives, open all the Certificates, and the Votes shall then be counted. The Person having the greatest Number of Votes shall be President, if such Number be a Majority of the whole Number of Electors appointed; and if there be more than one who have such Majority, and have an equal Number of Votes, then the House of Representatives shall immediately Chuse by Ballot one of them for President; and if no Person have a Majority, then from the five highest on the List the said House shall in like manner Chuse the President. But in Chusing the President, the Votes shall be taken by States, the Representation from each State having one Vote; A quorum for this Purpose shall consist of a Member or Members from two thirds of the States, and a Majority of all the States shall be necessary to a Choice. In every Case, after the Choice of the President, the Person having the greatest Number of Votes of the Electors shall be the Vice President. But if there should remain two or more who have equal Votes, the Senate shall Chuse from them by Ballot the Vice President.]

[4.] The Congress may determine the Time of Chusing the Electors, and the Day on which they shall give their Votes; which Day shall be the same throughout the United States.

[5.] No Person except a natural born Citizen, or a Citizen of the United States, at the time of the Adoption of this Constitution, shall be eligible to the Office of President; neither shall any Person be eligible to that Office who shall not have attained to the Age of thirty five Years, and been fourteen Years a Resident within the United States.

[6.] In Case of the Removal of the President from Office, or of his Death, Resignation, or Inability to discharge the Powers and Duties of the said Office, the Same shall devolve on the Vice President, and the Congress may by Law provide for the Case of Removal, Death, Resignation or Inability, both of the President and Vice President, declaring what Officer shall then act as President, and such Officer shall act accordingly, until the Disability be removed, or a President shall be elected.

[7.] The President shall, at stated Times, receive for his Services, a Compensation, which shall neither be encreased nor diminished during the Period for which he shall have been elected, and he shall not receive within that Period any other Emolument from the United States, or any of them.

[8.] Before he enter on the Execution of his Office, he shall take the following Oath or Affirmation: - "I do solemnly swear (or affirm) that I will faithfully execute the Office of President of the United States, and will to the best of my Ability, preserve, protect and defend the Constitution of the United States."

May be reproduced.

### Sec. 2. [Commander-in-Chief--Pardons--Treaties--Appointment of officers.]

[1.] The President shall be Commander in Chief of the Army and Navy of the United States, and of the Militia of the several States, when called into the actual Service of the United States; he may require the Opinion, in writing, of the principal Officer in each of the executive Departments, upon any Subject relating to the Duties of their respective Offices, and he shall have power to grant Reprieves and Pardons for Offenses against the United States, except in Cases of Impeachment.

[2.] He shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur; and he shall nominate, and by and with the Advice and Consent of the Senate, shall appoint Ambassadors, other public Ministers and Consuls, Judges of the Supreme Court, and all other Officers of the United States, whose Appointments are not herein otherwise provided for, and which shall be established by Law: but the Congress may by Law vest the Appointment of such inferior Officers, as they think proper, in the President alone, in the Courts of Law, or in the Heads of Departments.

[3.] The President shall have Power to fill up all Vaçancies that may happen during the Recess of the Senate, by granting Commissions which shall expire at the End of their next Session.

### Sec. 3. [Miscellaneous powers and duties.]

He shall from time to time give to the Congress Information of the State of Union, and recommend to their Consideration such Measures as he shall judge necessary and expedient; he may, on extraordinary Occasions, convene both Houses, or either of them, and in Case of Disagreement between them, with Respect to the Time of Adjournment, he may adjourn them to such Time as he shall think proper; he shall receive Ambassadors and other public Ministers; he shall take Care that the Laws be faithfully executed, and shall Commission all the Officers of the United States.

### Sec. 4. [Impeachment.]

The President, Vice President and all civil Officers of the United States, shall be removed from Office on Impeachment for, and Conviction of, Treason, Bribery, or other high Crimes and Misdemeanors.

## ARTICLE III

## JUDICIAL DEPARTMENT

### Section 1. [Judicial power.]

The judicial Power of the United States, shall be vested in one supreme Court, and in such inferior Courts as the Congress may from time to time ordain and establish. The Judges, both of the supreme and inferior Courts, shall hold their Offices during good Behavior, and shall, at stated Times, receive for their Services, a Compensation, which shall not be diminished during their Continuance in Office.

### Sec. 2. [Extent of judicial power--Supreme Court--Trial and places of trial.]

[1.] The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, and Treaties made, or which shall be made, under their Authority; —to all Cases affecting Ambassadors, other public Ministers and Consuls; —to all Cases of admiralty and maritime Jurisdiction; —to Controversies to which the United States shall be a Party; —to Controversies between two or more States; —between a State and Citizens of another State; —between Citizens of different States; —between Citizens of the same State claiming Lands under Grants of different States, and between a State, or the Citizens thereof, and foreign States, Citizens or Subjects.

[2] In all Cases affecting Ambassadors, other public Ministers and Consuls, and those in which a State shall be Party, the supreme Court shall have original Jurisdiction. In all the other Cases before mentioned, the supreme Court shall have appellate Jurisdiction, both as to Law and Fact, with such Exceptions, and under such Regulations as the Congress shall make.
3.] The Trial of all Crimes, except in Cases of Impeachment, shall be by Jury; and such Trial shall be held in the State where the

said Crime shall have been committed; but when not committed within any State, the Trial shall be at such Place or Places as the Congress may by Law have directed.

### Sec. 3. [Treason, proof and punishment.]

[1.] Treason against the United States, shall consist only in levying War against them, or in adhering to their Enemies, giving them Aid and Comfort. No Person shall be convicted of Treason unless on the Testimony of two Witnesses to the same overt Act, or on Confession in open Court.

[2.] The Congress shall have Power to declare the Punishment of Treason, but no Attainder of Treason shall work Corruption of Blood, or Forfeiture except during the Life of the Person attainted.

## ARTICLE IV

## STATE AND TERRITORIAL RELATIONS

### Section 1. [Full faith and credit to records and judicial proceedings of states.]

Full Faith and Credit shall be given in each State to the public Acts, Records, and judicial Proceedings of every other State. And the Congress may by general Laws prescribe the Manner in which such Acts, Records and Proceedings shall be proved, and Effect thereof.

### Sec. 2. [Privileges and immunities-Fugitives from justice and service.]

[1.] The Citizens of each State shall be entitled to all Privileges and Immunities of Citizens in the several States.

[2.] A Person charged in any State with Treason, Felony, or other Crime, who shall flee from Justice, and be found in another State, shall on Demand of the executive Authority of the State from which he fled, be delivered up, to be removed to the State having Jurisdiction of the Crime.

[3.] No Person held to Service or Labour in one State, under the Laws thereof, escaping into another, shall, in Consequence of any Law or Regulation therein, be discharged from such Service or Labour, but shall be delivered up on Claim of the Party to whom such Service or Labour may be due.

### Sec. 3. [Admission of states--Rules and regulations respecting the territory and property of the United States.]

[1.] New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the Jurisdiction of any other State; nor any State be formed by the Junction of two or more States, or Parts of States, without the Consent of the Legislatures of the States concerned as well as of the Congress.

[2.] The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State.

### Sec. 4 [Guaranty of republican form of government and against invasion.]

The United States shall guarantee to every State in this Union a Republican Form of Government, and shall protect each of them against Invasion; and on Application of the Legislature, or of the Executive (when the Legislature cannot be convened) against domestic Violence.

## ARTICLE V

## AMENDMENT

### [Mode of amendment.]

The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose Amendments to this Constitution, or, on the Application of the Legislatures of two thirds of the several States, shall call a Convention for proposing Amendments, which, in either Case, shall be valid to all Intents and Purposes, as Part of this Constitution, when ratified by the Legislatures of three fourths of the several States, or by Conventions in three fourths thereof, as the one or the other Mode of Ratification may be proposed by the Congress; Provided that no Amendment which may be made prior to the Year One thousand eight hundred and eight shall in any Manner affect the first and fourth Clauses in the Ninth Section of the first Article; and that no State, without its Consent, shall be deprived of its equal Suffrage in the Senate.

## ARTICLE VI

## MISCELLANEOUS PROVISIONS

### [Assumption of public debt--Supreme Law--Oath of office--Religious tests prohibited.]

[1.] All Debts contracted and Engagements entered into, before the Adoption of this Constitution, shall be as valid against the United States under this Constitution, as under the Confederation.

[2.] This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

[3.] The Senators and Representatives before mentioned, and the Members of the several State Legislatures, and all executive and judicial Officers, both of the United States and of the several States, shall be bound by Oath or Affirmation, to support this Constitution; but no religious Test shall ever be required as a Qualification to any Office or public Trust under the United States.

## ARTICLE VII

## ADOPTION

### [Ratification--Attestation.]

The Ratification of the Conventions of nine States, shall be sufficient for the Establishment of this Constitution between the States so ratifying the Same.

Done in Convention by the Unanimous Consent of the States present the Seventeenth Day of September in the Year of Our Lord one thousand seven hundred and Eighty seven and of the Independence of the United States of America the Twelfth.

STUDENT
ACTIVITY

# Agency Budget Data Sheet

## Purpose

Agency Budget Data over time provides information regarding the relative importance people place on certain activities. Society is more willing to increase budgets for something it values than for something it does not.

## Directions

Review the data listed below. As a group, brainstorm as many possible conclusions as you can based upon the data. Be prepared to share your ideas with the class.

**Costs of Selected Federal Regulatory Agencies**
**(in millions of dollars)**

| **Agency** | 1970 | 1975 | estimated<br>1980 | 1985 | 1990 |
|---|---|---|---|---|---|
| Environmental Protection Agency | $205 | $794 | $1360 | $1928 | $3623 |
| Department of Agriculture | 294 | 483 | 770 | 950 | 1090 |
| Food and Drug Administration | 80 | 207 | 334 | 437 | 625 |
| Drug Enforcement Administration | 2 | 12 | 13 | 18 | 28 |
| Occupational Safety and Health Administration | - | 97 | 191 | 220 | 267 |
| Nuclear Regulatory Commission | 64 | 148 | 396 | 445 | 451 |
| Federal Trade Commission | 21 | 39 | 66 | 66 | 74 |
| Federal Energy Regulatory Commission | 18 | 33 | 68 | 98 | 117 |

Source: Center for the Study of American Business, Washington University.
Derived from the Budget of the United States Government and related documents, various fiscal years.

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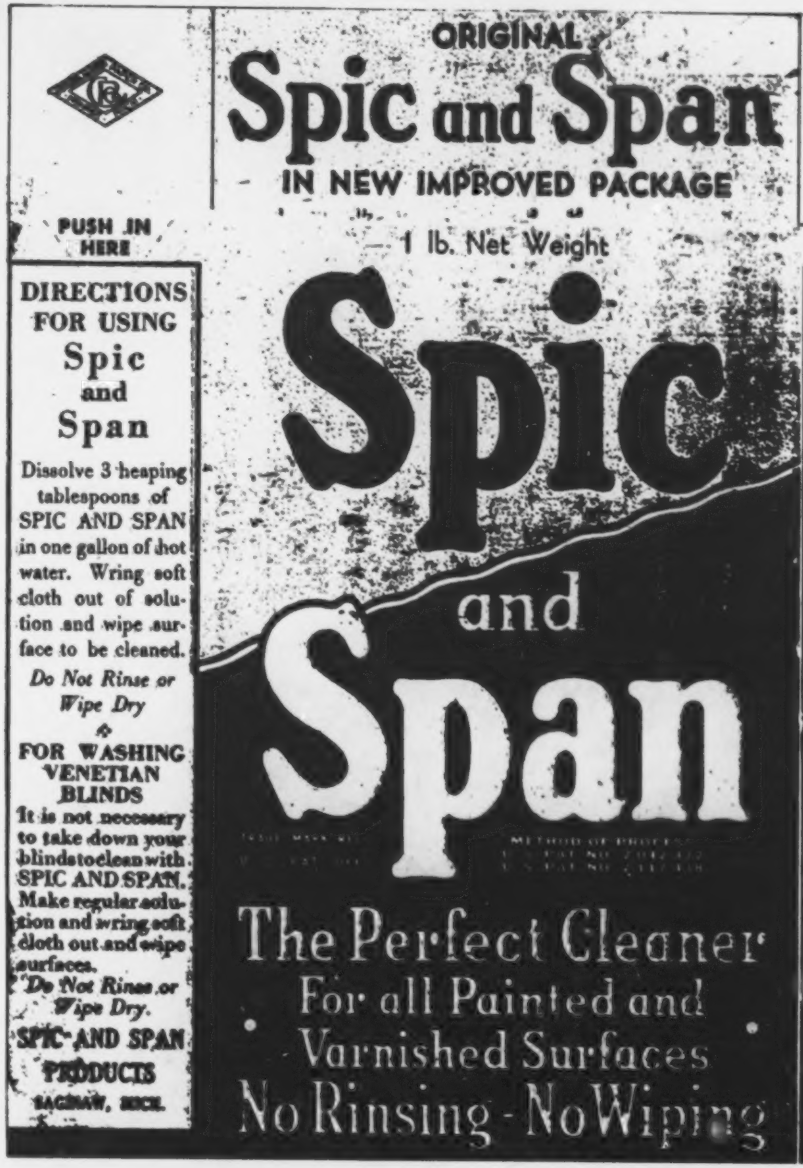


ORIGINAL

Spic and Span

IN NEW IMPROVED PACKAGE

PUSH IN HERE

1 lb. Net Weight

Spic and Span

TRADE MARK REG.
U.S. PAT. OFF.

METHOD OF PROCESS
U.S. PAT. NO. [illegible]
U.S. PAT. NO. [illegible]

The Perfect Cleaner
For all Painted and
Varnished Surfaces
No Rinsing - No Wiping

**DIRECTIONS FOR USING**
**Spic and Span**

Dissolve 3 heaping tablespoons of SPIC AND SPAN in one gallon of hot water. Wring soft cloth out of solution and wipe surface to be cleaned.

*Do Not Rinse or Wipe Dry*

◆

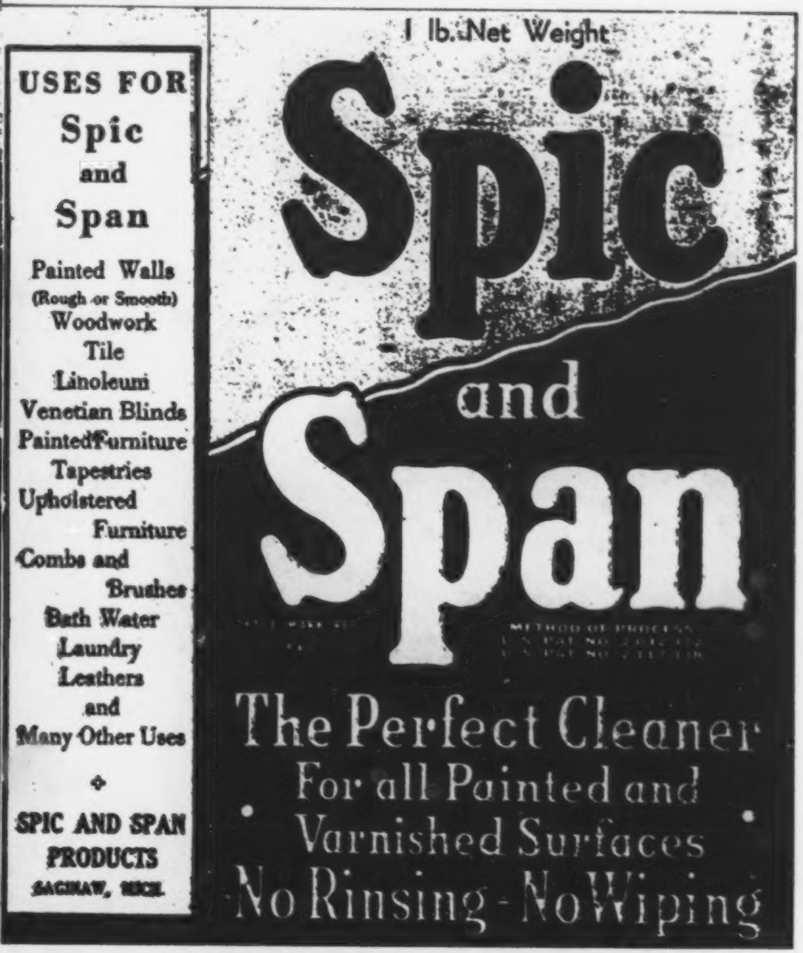
**FOR WASHING VENETIAN BLINDS**

It is not necessary to take down your blinds to clean with SPIC AND SPAN. Make regular solution and wring soft cloth out and wipe surfaces.

*Do Not Rinse or Wipe Dry.*

**SPIC AND SPAN PRODUCTS**
SAGINAW, MICH.

291



**USES FOR**
**Spic and Span**

- Painted Walls (Rough or Smooth)
- Woodwork
- Tile
- Linoleum
- Venetian Blinds
- Painted Furniture
- Tapestries
- Upholstered Furniture
- Combs and Brushes
- Bath Water
- Laundry
- Leathers
- and Many Other Uses

◆

**SPIC AND SPAN PRODUCTS**
SAGINAW, MICH.

1 lb. Net Weight

Spic and Span

TRADE MARK REG.
U.S. PAT. OFF.

METHOD OF PROCESS
U.S. PAT. NO. [illegible]
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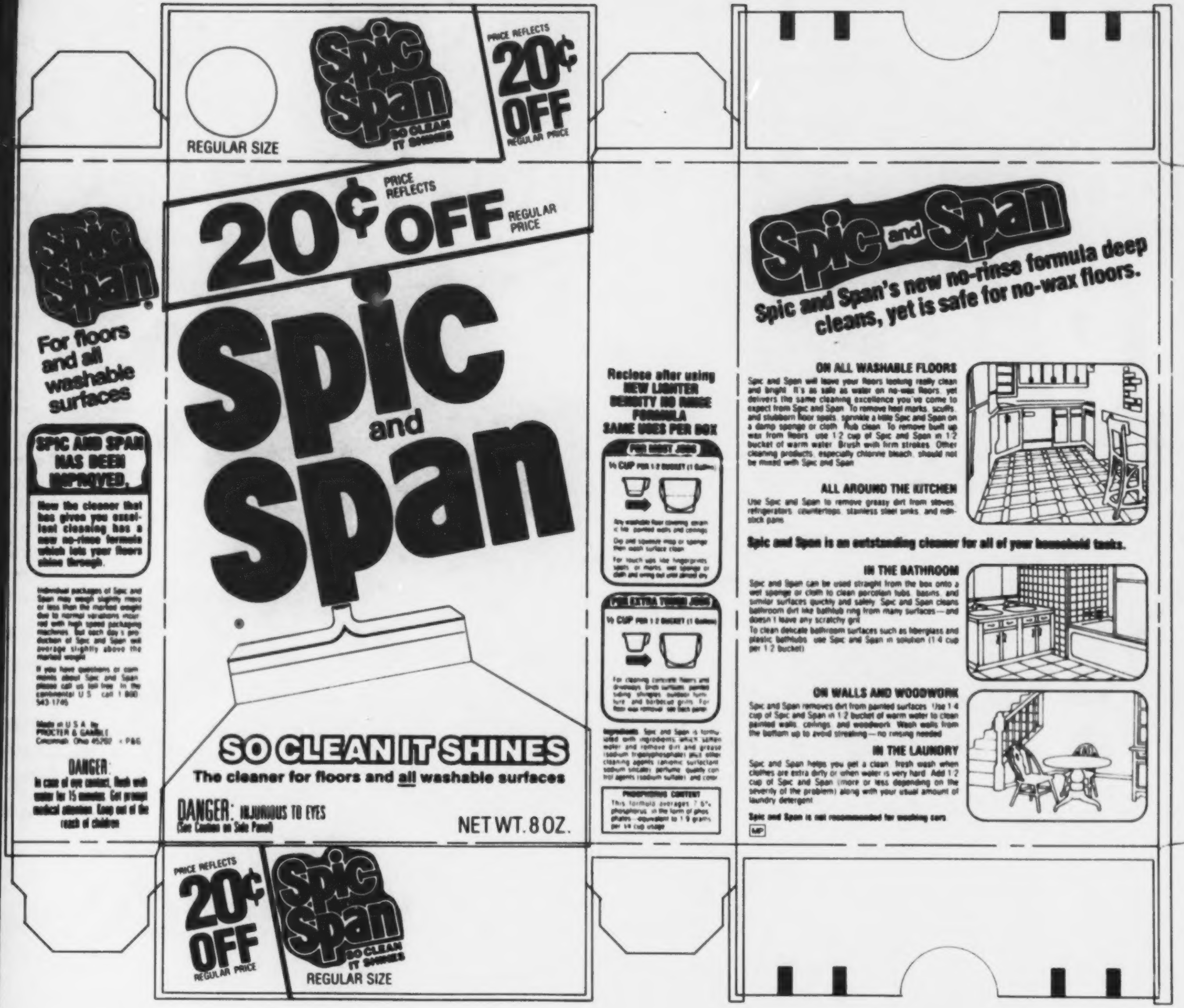
292



REGULAR SIZE

Spic Span

SO CLEAN IT SHINES

PRICE REFLECTS 20¢ OFF REGULAR PRICE

Spic Span®

For floors and all washable surfaces

**SPIC AND SPAN HAS BEEN IMPROVED.**

**Now the cleaner that has given you excellent cleaning has a new no-rinse formula which lets your floors shine through.**

Individual packages of Spic and Span may weigh slightly more or less than the marked weight due to normal variations incurred with high speed packaging machines. But each day's production of Spic and Span will average slightly above the marked weight.

If you have questions or comments about Spic and Span please call us toll free. In the continental U.S. call 1-800-543-1745

Made in U.S.A. by
PROCTER & GAMBLE
Cincinnati, Ohio 45202 © P&G

**DANGER:**

**In case of eye contact, flush with water for 15 minutes. Get prompt medical attention. Keep out of the reach of children.**

20¢ OFF PRICE REFLECTS REGULAR PRICE

Spic and Span

SO CLEAN IT SHINES

**The cleaner for floors and all washable surfaces**

DANGER: INJURIOUS TO EYES
(See Caution on Side Panel)

NET WT. 8 OZ.

**Reclose after using**
**NEW LIGHTER DENSITY NO RINSE FORMULA**
**SAME USES PER BOX**

**FOR MOST JOBS**

¼ CUP PER 1/2 BUCKET (1 Gallon)

Any washable floor covering, ceramic tile, painted walls and ceilings.

Dip and squeeze mop or sponge, then wash surface clean.

For touch ups like fingerprints, spots, or marks, wet sponge or cloth and wring out until almost dry.

**FOR EXTRA TOUGH JOBS**

½ CUP PER 1/2 BUCKET (1 Gallon)

For cleaning concrete floors and driveways, brick surfaces, painted siding, shingles, outdoor furniture and barbecue grills. For floor wax removal see back panel.

**Ingredients:** Spic and Span is formulated with ingredients which soften water and remove dirt and grease (sodium tripolyphosphate) plus other cleaning agents (anionic surfactant, sodium silicate), perfume, quality control agents (sodium sulfate) and color.

**PHOSPHORUS CONTENT**
This formula averages 7.6% phosphorus in the form of phosphates—equivalent to 1.9 grams per 1/4 cup usage.

Spic and Span

**Spic and Span's new no-rinse formula deep cleans, yet is safe for no-wax floors.**

**ON ALL WASHABLE FLOORS**

Spic and Span will leave your floors looking really clean and bright. It's as safe as water on no-wax floors, yet delivers the same cleaning excellence you've come to expect from Spic and Span. To remove heel marks, scuffs, and stubborn floor spots, sprinkle a little Spic and Span on a damp sponge or cloth. Rub clean. To remove built up wax from floors, use 1/2 cup of Spic and Span in 1/2 bucket of warm water. Brush with firm strokes. Other cleaning products, especially chlorine bleach, should not be mixed with Spic and Span.

**ALL AROUND THE KITCHEN**

Use Spic and Span to remove greasy dirt from stoves, refrigerators, countertops, stainless steel sinks, and non-stick pans.

**Spic and Span is an outstanding cleaner for all of your household tasks.**

**IN THE BATHROOM**

Spic and Span can be used straight from the box onto a wet sponge or cloth to clean porcelain tubs, basins, and similar surfaces quickly and safely. Spic and Span cleans bathroom dirt like bathtub ring from many surfaces—and doesn't leave any scratchy grit.

To clean delicate bathroom surfaces such as fiberglass and plastic bathtubs, use Spic and Span in solution (1/4 cup per 1/2 bucket).

**ON WALLS AND WOODWORK**

Spic and Span removes dirt from painted surfaces. Use 1/4 cup of Spic and Span in 1/2 bucket of warm water to clean painted walls, ceilings, and woodwork. Wash walls from the bottom up to avoid streaking—no rinsing needed.

**IN THE LAUNDRY**

Spic and Span helps you get a clean, fresh wash when clothes are extra dirty or when water is very hard. Add 1/2 cup of Spic and Span (more or less depending on the severity of the problem) along with your usual amount of laundry detergent.

**Spic and Span is not recommended for washing cars.**

MP

PRICE REFLECTS 20¢ OFF REGULAR PRICE

Spic Span

SO CLEAN IT SHINES

REGULAR SIZE

21

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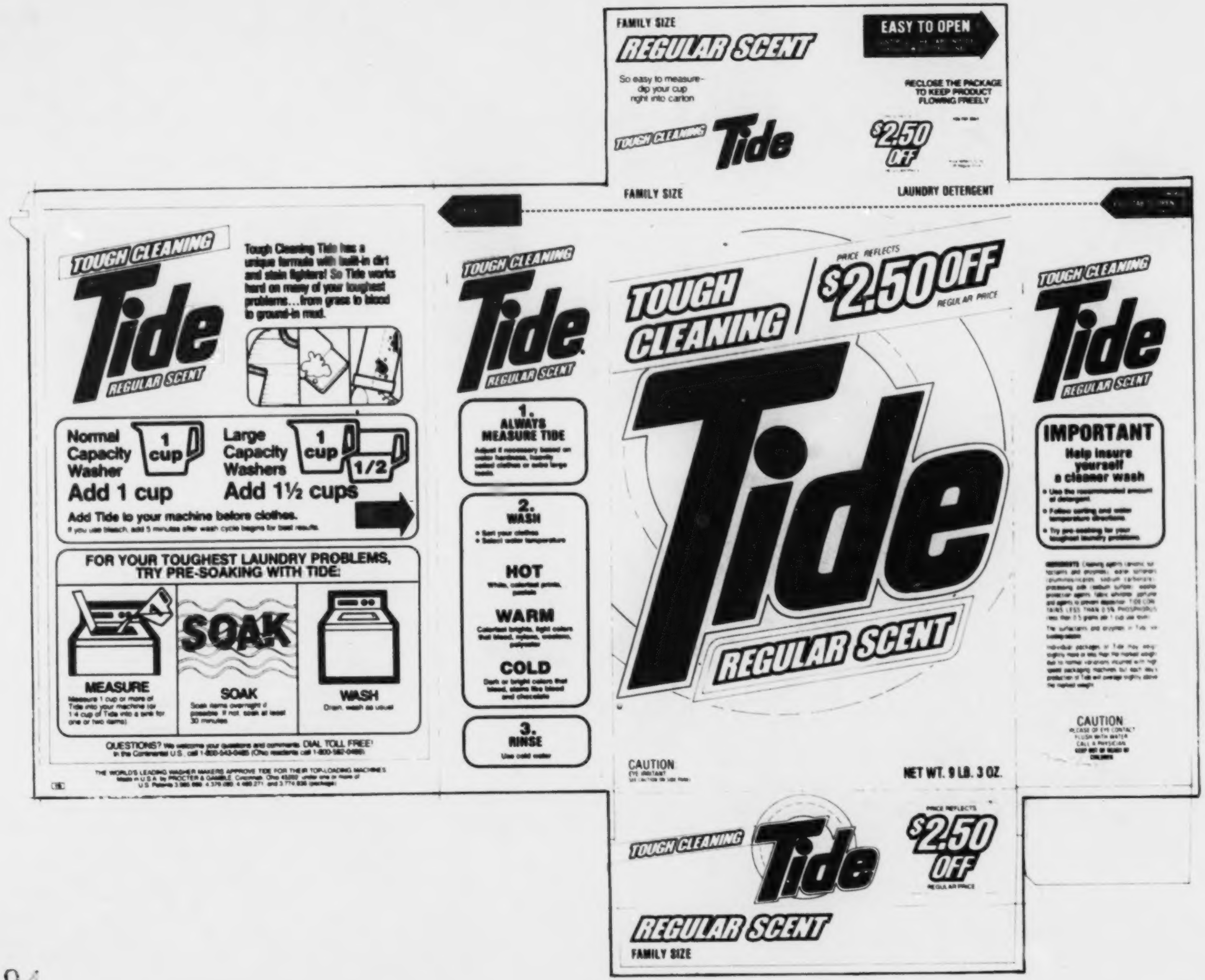


Tough Cleaning Tide has a unique formula with built-in dirt and stain fighters! So Tide works hard on many of your toughest problems…from grass to blood to ground-in mud.

Normal Capacity Washer Add 1 cup

Large Capacity Washers Add 1½ cups

Add Tide to your machine before clothes.

FOR YOUR TOUGHEST LAUNDRY PROBLEMS, TRY PRE-SOAKING WITH TIDE:

MEASURE

SOAK

WASH

QUESTIONS? We welcome your questions and comments. DIAL TOLL FREE! In the Continental U.S. call 1-800-543-0485 (Ohio residents call 1-800-582-0485)

THE WORLD'S LEADING WASHER MAKERS APPROVE TIDE FOR THEIR TOP-LOADING MACHINES

Made in U.S.A. by PROCTER & GAMBLE, Cincinnati, Ohio 45202

1. ALWAYS MEASURE TIDE

2. WASH

HOT

WARM

COLD

3. RINSE

Use cold water

IMPORTANT

Help insure yourself a cleaner wash

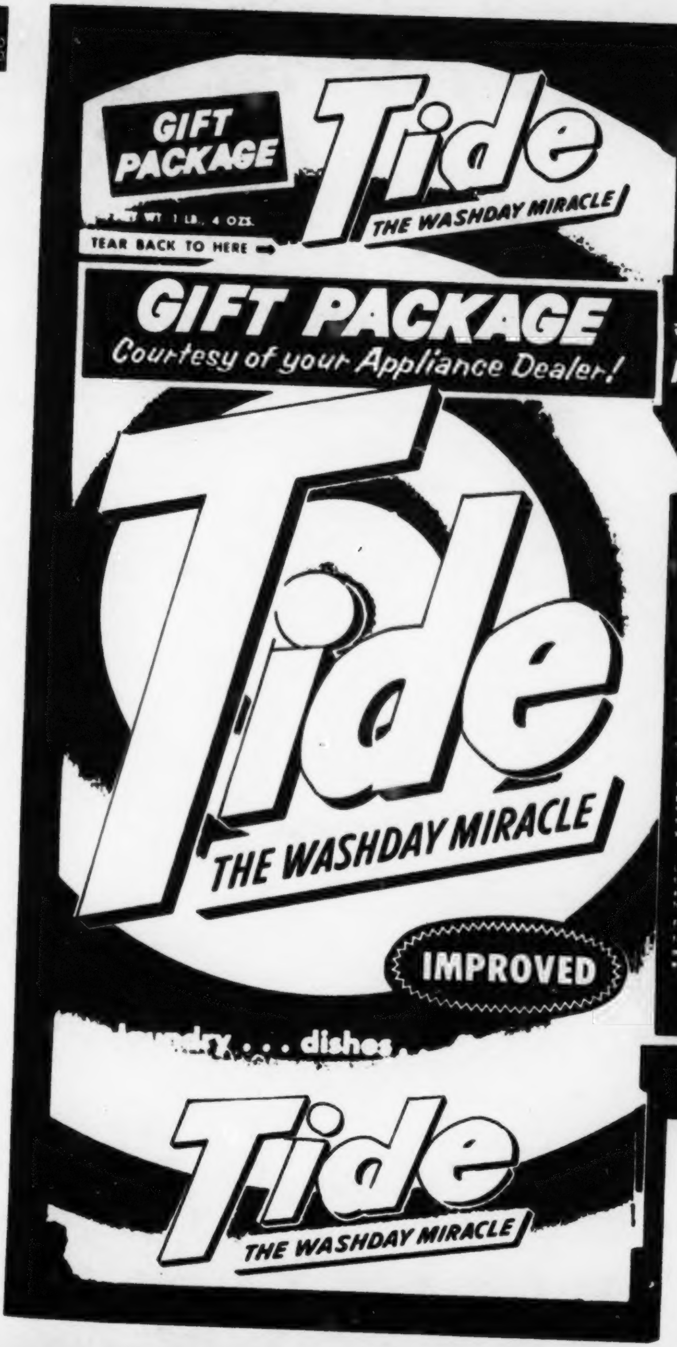
CAUTION

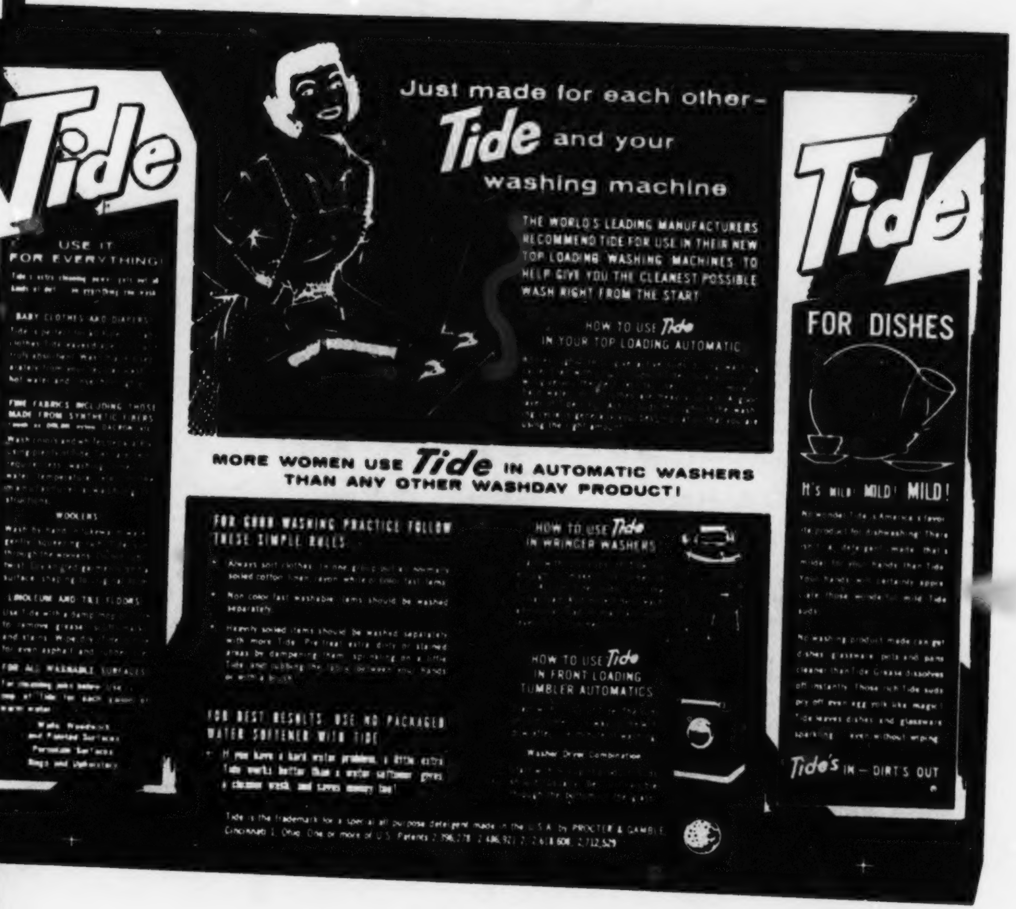
So easy to measure-dip your cup right into carton

RECLOSE THE PACKAGE TO KEEP PRODUCT FLOWING FREELY

NET WT. 9 LB. 3 OZ.

TOUGH CLEANING
Tide
REGULAR SCENT
1 cup
1/2
SOAK
FAMILY SIZE
EASY TO OPEN
$2.50 OFF
LAUNDRY DETERGENT
PRICE REFLECTS
$2.50 OFF
REGULAR PRICE
CAUTION
EYE IRRITANT


GIFT PACKAGE
Tide
THE WASHDAY MIRACLE
T WT 1 LB., 4 OZS.
TEAR BACK TO HERE
GIFT PACKAGE
Courtesy of your Appliance Dealer!
Tide
THE WASHDAY MIRACLE
IMPROVED
laundry . . . dishes
Tide
THE WASHDAY MIRACLE


Tide
Just made for each other—
Tide and your washing machine
Tide
FOR DISHES
MORE WOMEN USE Tide IN AUTOMATIC WASHERS THAN ANY OTHER WASHDAY PRODUCT!
Tide's IN — DIRT'S OUT

USE IT FOR EVERYTHING!

BABY CLOTHES AND DIAPERS

FINE FABRICS INCLUDING THOSE MADE FROM SYNTHETIC FIBERS

WOOLENS

LINOLEUM AND TILE FLOORS

FOR ALL WASHABLE SURFACES

Walls, Woodwork
and Painted Surfaces
Porcelain Surfaces
Rugs and Upholstery

THE WORLD'S LEADING MANUFACTURERS RECOMMEND TIDE FOR USE IN THEIR NEW TOP LOADING WASHING MACHINES TO HELP GIVE YOU THE CLEANEST POSSIBLE WASH RIGHT FROM THE START

HOW TO USE Tide IN YOUR TOP LOADING AUTOMATIC

FOR GOOD WASHING PRACTICE FOLLOW THESE SIMPLE RULES

- Always sort clothes in one group put all normally soiled cotton, linen, rayon white or color fast items.
- Non color fast washable items should be washed separately.
- Heavily soiled items should be washed separately with more Tide. Pre-treat extra dirty or stained areas by dampening them, sprinkling on a little Tide and rubbing the fabric between your hands or with a brush.

FOR BEST RESULTS USE NO PACKAGED WATER SOFTENER WITH TIDE

- If you have a hard water problem, a little extra Tide works better than a water softener, gives a cleaner wash, and saves money too!

HOW TO USE Tide IN WRINGER WASHERS

HOW TO USE Tide IN FRONT LOADING TUMBLER AUTOMATICS

Washer Dryer Combination

Tide is the trademark for a special all purpose detergent made in the U.S.A. by PROCTER & GAMBLE, Cincinnati 1, Ohio. One or more of U.S. Patents 2,396,278, 2,486,921, 2,618,606, 2,712,529

FOR DISHES

IT'S MILD! MILD! MILD!

No wonder Tide is America's favorite product for dishwashing! There isn't a detergent made that's milder for your hands than Tide. Your hands will certainly appreciate those wonderful mild Tide suds.

No washing product made can get dishes, glassware, pots and pans cleaner than Tide. Grease dissolves off instantly. Those rich Tide suds pry off even egg yolk like magic! Tide leaves dishes and glassware sparkling — even without wiping.

Tide's IN — DIRT'S OUT

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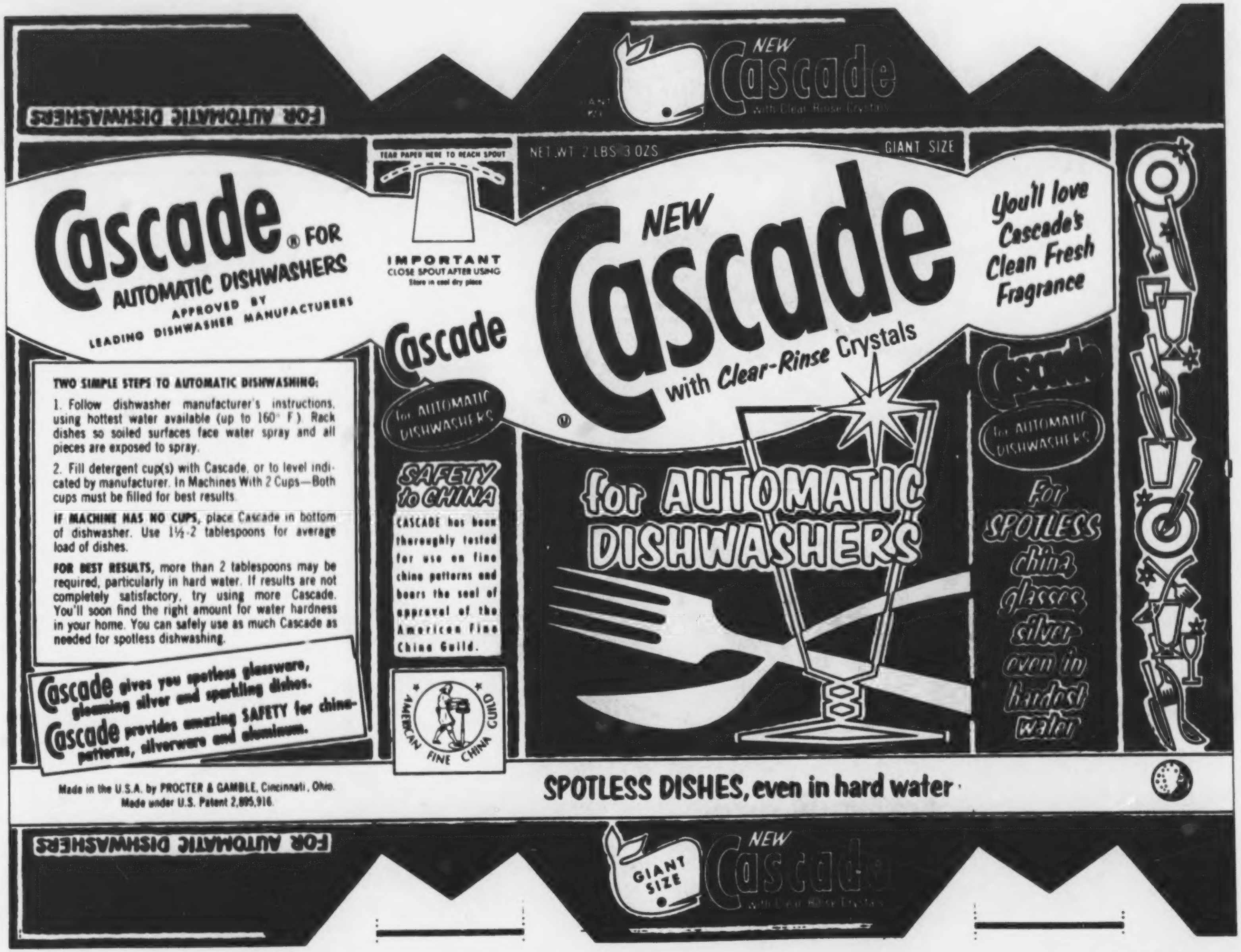
1966


NEW
Cascade
with Clear-Rinse Crystals
GIANT SIZE
FOR AUTOMATIC DISHWASHERS
TEAR PAPER HERE TO REACH SPOUT
NET. WT. 2 LBS. 3 OZS.
GIANT SIZE
Cascade® FOR
AUTOMATIC DISHWASHERS
APPROVED BY
LEADING DISHWASHER MANUFACTURERS
IMPORTANT
CLOSE SPOUT AFTER USING
Store in cool dry place
Cascade
for AUTOMATIC DISHWASHERS
NEW
Cascade
with Clear-Rinse Crystals
for AUTOMATIC DISHWASHERS
You'll love Cascade's Clean Fresh Fragrance
Cascade
for AUTOMATIC DISHWASHERS
For SPOTLESS china, glasses, silver even in hardest water
SAFETY to CHINA
AMERICAN FINE CHINA GUILD
SPOTLESS DISHES, even in hard water

**TWO SIMPLE STEPS TO AUTOMATIC DISHWASHING:**

1. Follow dishwasher manufacturer's instructions, using hottest water available (up to 160° F). Rack dishes so soiled surfaces face water spray and all pieces are exposed to spray.

2. Fill detergent cup(s) with Cascade, or to level indicated by manufacturer. In Machines With 2 Cups—Both cups must be filled for best results.

**IF MACHINE HAS NO CUPS,** place Cascade in bottom of dishwasher. Use 1½-2 tablespoons for average load of dishes.

**FOR BEST RESULTS,** more than 2 tablespoons may be required, particularly in hard water. If results are not completely satisfactory, try using more Cascade. You'll soon find the right amount for water hardness in your home. You can safely use as much Cascade as needed for spotless dishwashing.

Cascade gives you spotless glassware, gleaming silver and sparkling dishes.
Cascade provides amazing SAFETY for china-patterns, silverware and aluminum.

CASCADE has been thoroughly tested for use on fine china patterns and bears the seal of approval of the American Fine China Guild.

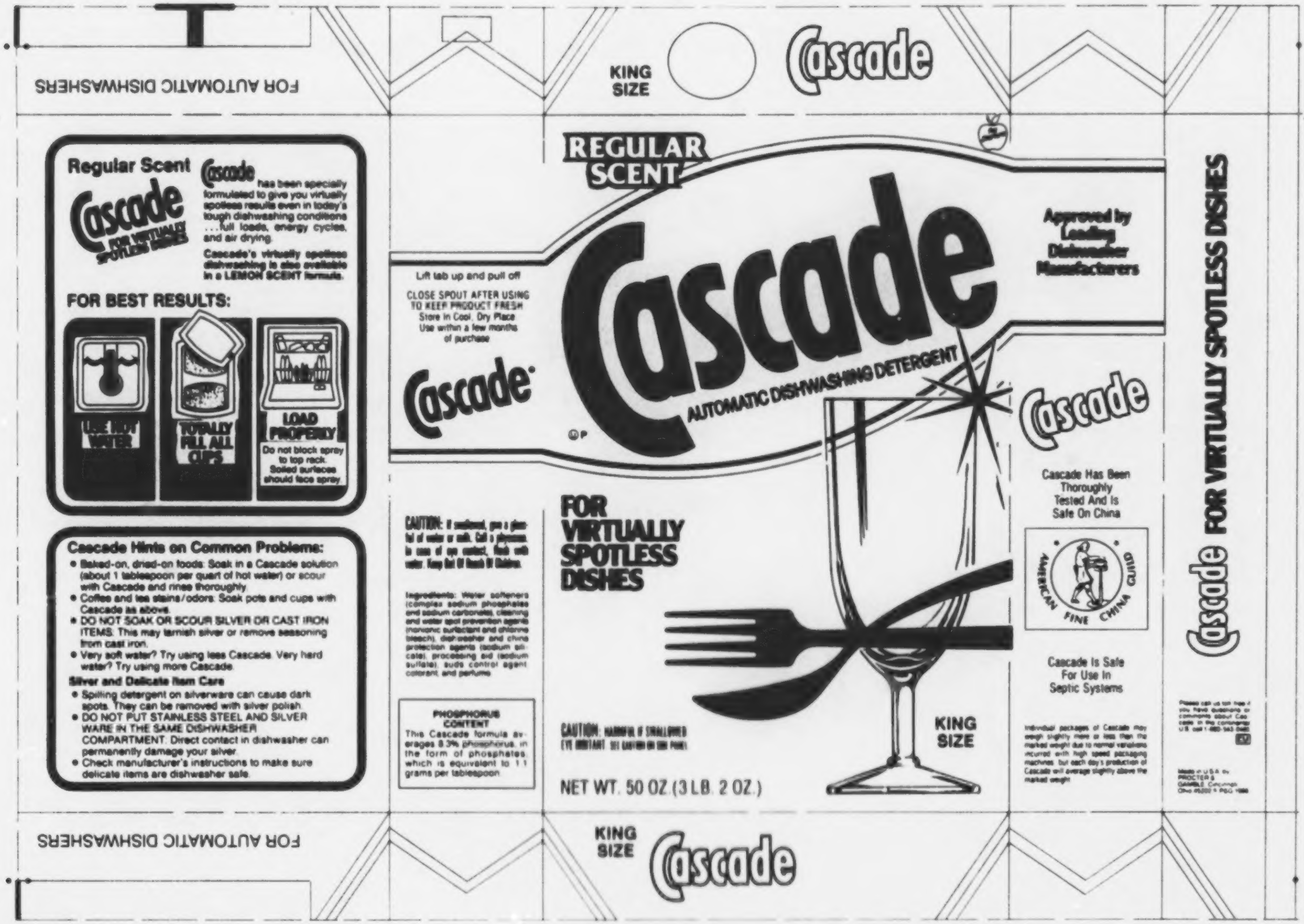
Made in the U.S.A. by PROCTER & GAMBLE, Cincinnati, Ohio.
Made under U.S. Patent 2,895,916.

298

299

24

1987



FOR AUTOMATIC DISHWASHERS

**Regular Scent** Cascade has been specially formulated to give you virtually spotless results even in today's tough dishwashing conditions . . . full loads, energy cycles, and air drying.

Cascade FOR VIRTUALLY SPOTLESS DISHES

Cascade's virtually spotless dishwashing is also available in a LEMON SCENT formula.

**FOR BEST RESULTS:**

- USE HOT WATER
- TOTALLY FILL ALL CUPS
- LOAD PROPERLY Do not block spray to top rack. Soiled surfaces should face spray.

**Cascade Hints on Common Problems:**

- Baked-on, dried-on foods: Soak in a Cascade solution (about 1 tablespoon per quart of hot water) or scour with Cascade and rinse thoroughly.
- Coffee and tea stains/odors: Soak pots and cups with Cascade as above.
- DO NOT SOAK OR SCOUR SILVER OR CAST IRON ITEMS. This may tarnish silver or remove seasoning from cast iron.
- Very soft water? Try using less Cascade. Very hard water? Try using more Cascade.

**Silver and Delicate Item Care**

- Spilling detergent on silverware can cause dark spots. They can be removed with silver polish.
- DO NOT PUT STAINLESS STEEL AND SILVER WARE IN THE SAME DISHWASHER COMPARTMENT. Direct contact in dishwasher can permanently damage your silver.
- Check manufacturer's instructions to make sure delicate items are dishwasher safe.

FOR AUTOMATIC DISHWASHERS

Lift tab up and pull off

CLOSE SPOUT AFTER USING TO KEEP PRODUCT FRESH
Store in Cool, Dry Place
Use within a few months of purchase

Cascade

**CAUTION:** If swallowed, give a glassful of water or milk. Call a physician. In case of eye contact, flush with water. Keep Out Of Reach Of Children.

Ingredients: Water softeners (complex sodium phosphates and sodium carbonate), cleaning and water spot prevention agents (nonionic surfactant and chlorine bleach), dishwasher and china protection agents (sodium silicate), processing aid (sodium sulfate), suds control agent, colorant, and perfume.

**PHOSPHORUS CONTENT**
This Cascade formula averages 8.3% phosphorus, in the form of phosphates, which is equivalent to 1.1 grams per tablespoon.

KING SIZE

Cascade

REGULAR SCENT

Cascade

AUTOMATIC DISHWASHING DETERGENT

FOR VIRTUALLY SPOTLESS DISHES

CAUTION: HARMFUL IF SWALLOWED
EYE IRRITANT SEE CAUTION ON SIDE PANEL

NET WT. 50 OZ. (3 LB. 2 OZ.)

KING SIZE

Approved by Leading Dishwasher Manufacturers

Cascade

Cascade Has Been Thoroughly Tested And Is Safe On China

Cascade Is Safe For Use In Septic Systems

Individual packages of Cascade may weigh slightly more or less than the marked weight due to normal variations incurred with high speed packaging machines, but each day's production of Cascade will average slightly above the marked weight.

Cascade FOR VIRTUALLY SPOTLESS DISHES

Please call us toll free if you have questions or comments about Cascade. In the continental U.S. call [illegible]

Made in U.S.A. by
PROCTER & GAMBLE, Cincinnati,
Ohio 45202 © P&G 1986

KING SIZE Cascade

FOR AUTOMATIC DISHWASHERS

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**SAVE 50¢**
*on next Lilt purchase*
with coupon printed inside back panel

Lilt

**SELF-CONDITIONING**
**LOTION PERM**
*with Sponge End-Wraps*

Lilt

*Lotion Kit for*
*Normal Hair*

**IMPORTANT ADVICE BEFORE PERMING.**

- Do not perm if your hair has been bleached or highly lightened, frosted or permed within the past 3 months
- Use 2 kits if your hair is longer than shoulder length
- For children's hair, use a Lilt kit for Hard-to-Wave hair and check hair condition before perming
- If you have any questions or comments about Lilt please call us toll-free at 1-800-262-1637

PRICE REFLECTS
**$1.00 OFF**
REGULAR PRICE

**EASY!**
**SELF-CONDITIONING**

**LOTION PERM**
*with Sponge*
*End-Wraps*

Lilt

*Body, Waves or Curls*
**NORMAL HAIR**

*One LOTION Perm*

Lilt

*Lotion Kit for*
*Normal Hair*

This kit contains
- waving lotion
- neutralizer
- sponge end-wraps
- plastic cap and instructions

**Waving Lotion Ingredients**
Water, Ethanolamine Thioglycolate, Laureth-23, Ethanolamine, Mineral Oil, Fragrance, Polyquaternium-16, Potassium Oleate, Glycol Oleic Acid, D&C Red No. 27

**Neutralizer Ingredients**
Water, Hydrogen Peroxide, Laureth-23, Fragrance, Quaternium-18

Made in U.S.A. Distributed by
PROCTER & GAMBLE
Cincinnati, Ohio 45202
© 1985 P&G

## *Lilt Makes Perming Easy!*

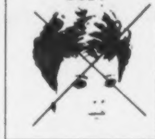
**Easy Conditioning**—Has built-in conditioners to give you a conditioned perm with the curl you expect without extra steps

**Easy To Use Sponge End-Wraps**—Grips hair better than paper end-wraps for a better roll-up that helps protect hair's ends, and that means less frizzies!

**Easy Instructions**—Provides a step-by-step illustrated guide for easy perming

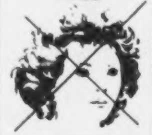
Use at least 30 large, thick rods for

**BODY**



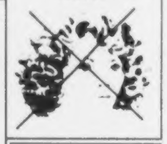
Use at least 40 medium size rods for

**WAVES**



Use at least 50 small, thin rods for

**CURLS**



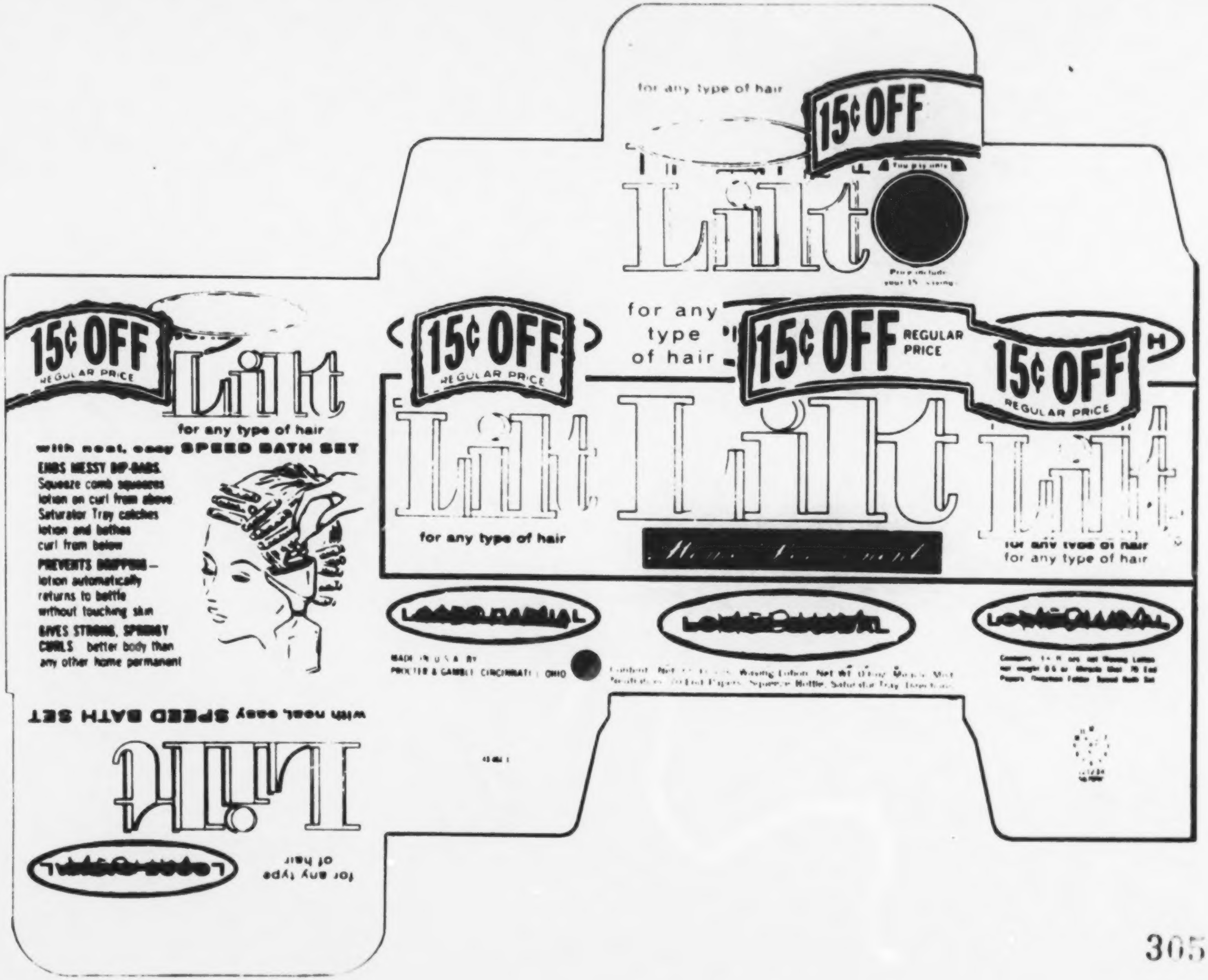
| **Lilt Kit** | **Hair Type** |
|---|---|
| Lilt Thin Color-Treated Hair Lotion Kit | For hair that takes and holds a perm or set very well, also for thin or color-treated hair |
| Lilt Normal Hair Lotion Kit | For normal hair |
| Lilt Thick Hard To Wave Hair Lotion Kit | For hair that does not take and hold a perm or set well, also for thick or coarse hair |

Lilt kits also come in two convenient foam strengths: For Thin Color-Treated Hair and For Normal or Thick Hard to Wave Hair

IMPORTANT: Follow all enclosed instructions carefully during perming. See left side panel of carton for additional advice before perming

Lilt

1964


for any type of hair
15¢ OFF
You pay only
Lilt
Price includes your 15¢ saving
15¢ OFF
REGULAR PRICE
Lilt
for any type of hair
15¢ OFF
REGULAR PRICE
Lilt
for any type of hair
for any type of hair
15¢ OFF
REGULAR PRICE
Lilt
Home Permanent
15¢ OFF
REGULAR PRICE
Lilt
for any type of hair
for any type of hair
with neat, easy SPEED BATH SET
Lilt
for any type of hair

with neat, easy SPEED BATH SET

ENDS MESSY DIP-DABS. Squeeze comb squeezes lotion on curl from above. Saturator Tray catches lotion and bathes curl from below

PREVENTS DRIPPING— lotion automatically returns to bottle without touching skin

GIVES STRONG, SPRINGY CURLS better body than any other home permanent

MADE IN U.S.A. BY
PROCTER & GAMBLE CINCINNATI, OHIO

[illegible] Waving Lotion. Net Wt [illegible] [illegible] End Papers, [illegible] Squeeze Bottle, Saturator Tray, Directions

Contents: [illegible] Waving Lotion [illegible] End Papers, Direction Folder, Speed Bath Set

304

305

STUDENT
ACTIVITY

# Chronology of Product Labels:

## Reading Labels for Information

**Purpose**

To discover the changing attitudes of consumers relating to safety, the environment, convenience and choice.

**Directions**

Carefully review the labels presented. Develop and write conclusions about the changing opinions of consumers and businesses in the spaces provided.

Product being reviewed___________________________

1. **DESCRIBE HOW THE LABELS HAVE CHANGED OVER TIME BOTH IN APPEARANCE AND CONTENT.**

2. **WHAT DO YOU THINK CONSUMERS VALUED IN THE PAST AND CURRENTLY IN RELATIONSHIP TO THIS PRODUCT?**

3. **DO THE LABELS SUGGEST THAT PEOPLE CHANGED THEIR ATTITUDES ABOUT PRODUCT SAFETY? HOW?**

4. **DO THE LABELS SUGGEST THAT PEOPLE CHANGED THEIR ATTITUDES ABOUT THE ENVIRONMENT? HOW?**

5. **DO YOU THINK THE PRODUCT IS BETTER TODAY THAN IN THE PAST? EXPLAIN.**

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STUDENT
BACKGROUND
READING

# An Executive Speaks

## About the World Marketplace

*The following speech, based on fact and edited for this lesson, was delivered by one of Procter & Gamble's executives to a meeting of the company's managers.*

It is my pleasure to meet with you today and to be back in the United States. As you know, I have spent the past few months in West Germany attempting to solve a unique problem with one of our products.

Lenor Fabric Softener sales were strong for many years. The German people felt the product was superior to others on the market. However, in the past few months sales dropped.

As business people, we had to ask, Why would consumers stop buying a product they really liked?

Our research supplied us with some interesting and useful facts. Germany is densely populated and environmental concerns, therefore, have a high impact. The Green Party, a political party concerned about the environment, moved into parliament in the early 80's. There is emotional power behind the word Umwelt. Umwelt means environment, or the world around us. This was the concern of the Green Party.

In other words, the German people became concerned about the quality of their Umwelt. No one wants to breathe bad air, swim in dirty water or drown in garbage. The concern over pollution translated into higher costs of disposing of solid wastes.

Consequently, the German people became concerned about the volume of garbage their families were generating. After all, it cost them money to dispose of every bulky item of trash. One bulky item which became visible was the Lenor fabric softener container. Because the German people did not want to pollute their environment and pay for the high cost of garbage disposal, the demand for Lenor Fabric Softener fell. Once Lenor captured 40% of the market, but fell to about 10%. A solution had to be found.

We needed an invention and so we invented the refill pouch. The new idea is to sell a concentrate of Lenor as a refill pack. You ask the consumer to pour it into their empty four liter bottle and add water to fill the container. Although this is an inconvenience to the consumer, the environmental and cost benefits gained outweighed the inconvenience cost.

The German people reacted enthusiastically. The sales are increasing. We listened to the consumer's wants. Let's hear it for Yankee ingenuity!

This response to problems in the marketplace is the type of commitment Procter & Gamble has to the 45 foreign countries currently receiving the benefits of our products.

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END

U.S. Dept. of Education

Office of Educational
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Date Filmed
July 11, 1991